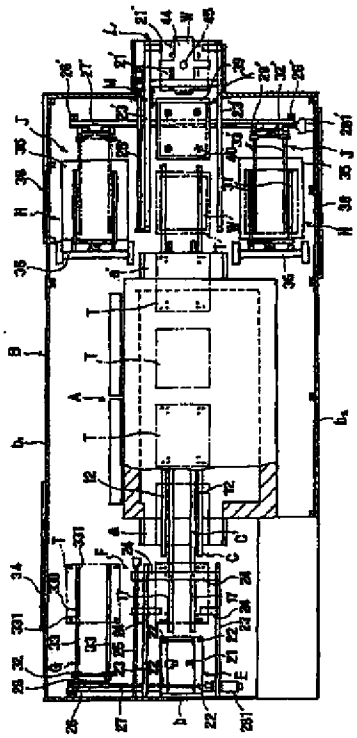
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is a top view showing one example of the continuous-heat-treatment device of the glass substrates by this design.
[Drawing 2]It is a vertical section side view of drawing 1.
[Drawing 3]It is a vertical section front view by the side of the downward REBETA mechanism of drawing 1.
[Drawing 4]It is a partial cross-sectional view of the furnace body lower region of drawing 1.
[Drawing 5]It is an enlarged plan view of the inlet area in drawing 1.
[Drawing 6]It is a sectional view which meets the V-V line of drawing 5.
[Drawing 7]It is a sectional view which meets the VI-VI line of drawing 5.
[Drawing 8]It is a partial notch sectional view which meets the VII-VII line of drawing 5.
[Drawing 9]It is a partial enlargement front view of a furnace body inlet area and an exit region.
[Drawing 10]It is a top view showing the relation between a tray, an elevator mechanism, and a walking-beam mechanism.
[Drawing 11]It is a top view showing another example of the tray used about this design.
[Drawing 12]It is a side view of the parallel arm used for the tray of drawing 11.
[Drawing 13]It is a front view in which a tray's accumulating and showing a state.
[Drawing 14]It is a partial enlarged plan view showing the relation between tray support and a tray rise implement (tray downward implement).
[Drawing 15]It is a partial enlargement front view showing the **** state of the tray by tray support and a tray rise implement (tray downward implement).
[Drawing 16]It is an enlarged plan view of the outlet area in drawing 1.
[Drawing 17]It is a sectional view which meets the XVII-XVII line of drawing 16.
[Drawing 18]It is a vertical section side view showing the tie in of a tray soaping-machine style and a traversing mechanism.
[Drawing 19]It is a partial notch side view in which taking over with a traversing mechanism and a glass substrate cooler style, and showing the relation of a moving mechanism.
[Drawing 20]It is a top view showing the details of a glass substrate extractor style.
[Drawing 21]Similarly it is the vertical section front view.
[Drawing 22]It is a side view showing the operation of a glass substrate extractor style gradually.
[Drawing 23]It is a perspective view of a tray containing box.
[Drawing 24]It is an explanatory view showing the move direction of glass substrates when a glass substrate extractor style is used.
[Drawing 25]It is a side view showing gradually the operation of the tray rise-and-fall change mechanism in this design.
[Drawing 26]It is a front view showing gradually the operation of the tray rise-and-fall change mechanism in this design.
[Drawing 27]It is a side view showing gradually the operation of the tray rise-and-fall change mechanism in this design.
[Description of Notations]
A Furnace body
B Box-like covering

E Glass substrate charging machine style
F Glass substrate taking over moving mechanism
G Entrance-side traversing mechanism
H Tray soaping-machine style
J Outlet side traversing mechanism
L Glass substrate extractor style
M Glass substrate taking over moving mechanism
P Annealing mechanism
T Tray
U Rise elevator mechanism
V Rise-and-fall change mechanism
W Glass substrates
a Entrance
a' exit
2 ******
3 Circulation stirring fan
4 Blowing-in mouth
5 Blast area
21 and 21' multi-thread band conveyor
39 Cool box
40 Ascending and descending means
41 Horizontal diaphragm
42 Water-cooled piping
43 Heater
44 Cradle
45 The actuator for reversal
394 Mounting side

[Translation done.]

Drawing selection Representative drawing



[Translation done.]

CLAIMS

[The scope of a claim for utility model registration]
[Claim 1]A continuous-heat-treatment device of glass substrates characterized by comprising the following.
Rise elevator mechanism U which carries out rise loading of the tray T which mounted the glass substrates W on right and left in the entrance a and a furnace body which has exit a' one by one.
While arranging downward elevator mechanism D which drops a tray one by one maintaining a loading state in the shape of parallel, in the upper part of a furnace body. The tray rise-and-fall change mechanism V which **** a tray of the loading top which went up by rise elevator mechanism U, carries out the horizontal transfer of this and is made to **** on a tray of the loading top of downward elevator mechanism D is formed, The upper part walking-beam mechanism C in which a tray which mounted glass substrates on a relation position which crosses the lower part of the furnace body A with said both elevator mechanisms is conveyed from an entrance to an outlet direction.
Bottom walking-beam mechanism C' which conveys a vacant tray in the direction of an entrance from an exit is provided, Traversing mechanism J which separates glass substrates while forming the annealing mechanism P of an atmosphere controlled circulation type in a lower half zone of downward elevator mechanism D at said furnace body and carrying out the **** substitute of the tray from the upper part walking-beam mechanism C further in an outlet line of a furnace body.
The glass substrate cooler style K which mounts glass substrates and cools this directly, and the glass substrate taking over moving mechanism L which transports the glass substrates separated by said traversing mechanism J to the glass substrate cooler style K.

[Claim 2]A continuous-heat-treatment device of glass substrates characterized by comprising the following.
The partition 2 of the shape of a vertical tube to which the annealing mechanism P has a cross-section area which allows free descent of a tray, and has the blast area 5 for the blowing-in mouth 4 with a heat-resistant filter in 1 side at other sides.
The fan 3 for circulation churning arranged on space between said partition 2 and a furnace body wall.
Water-cooled piping 42 allotted to space of a discharge side of the fan 3 for circulation churning.

[Claim 3]A continuous-heat-treatment device of the glass substrates according to claim 2 which upper space is divided with the horizontal diaphragm 41 rather than the water-cooled piping 42, and contain that on which the heater 43 for annealing ambient temperature regulation is arranged between absentminded from the horizontal diaphragm 41.
[Claim 4]A continuous-heat-treatment device of the glass substrates [provided with the glass substrate ascending and descending means 40 characterized by comprising the following] according to any one of claims 1 to 3.
The cool box 39 which the glass substrate cooler style K has the glass mounting side 394, and filled a refrigerant inside.
It pierces through the glass mounting side 394, and is an actuating rod which can project.

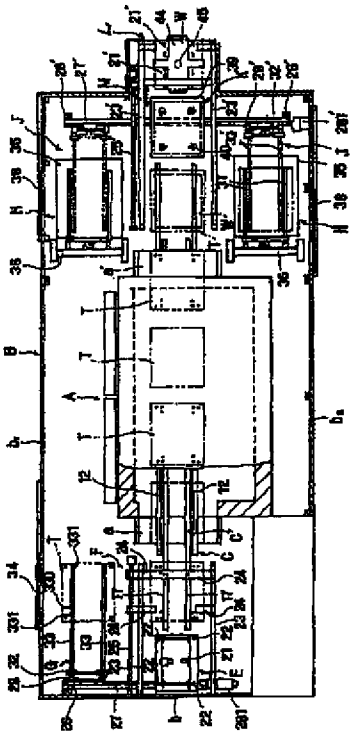
[Claim 5]A continuous-heat-treatment device of the glass substrates according to any one of claims 1 to 4 containing what has formed the glass substrate extractor style L which carries out horizontal inversion of the glass substrates to a terminal of an outlet line of a furnace body, and sends it out to it.

The cradle 44 of the glass substrates allotted between multi-thread band-conveyor 21'.
The actuator 45 for reversal rotated while locating this cradle 44 in a low rank from the tension side of multi-thread band-conveyor 21' in a normal state and raising the cradle 44 on a higher rank from the tension side of multi-thread band-conveyor 21' at the time of an important point.

[Claim 7]A continuous-heat-treatment device of the glass substrates according to any one of claims 1 to 6 which contain that for which parallel translation is free to an outlet line that it has the tray soaping-machine style H in the outlet line side of a furnace body, and traversing mechanism J should transport a tray to the tray soaping-machine style H.

[Translation done.]

Drawing selection | Representative drawing ▼



[Translation done.]

DETAILED DESCRIPTION

[Detailed explanation of the device]
[0001]
[Industrial Application]
This design is related mainly with the continuous-heat-treatment device of the glass substrates for liquid crystal display devices.
[0002]
[Description of the Prior Art]
In the manufacturing process of a liquid crystal display device (LCD), After washing a glass substrate and drying, a minutely highly precise transparent electrode and counterelectrode are formed, The thing which formed and carried out rubbing of the molecular orientation layer to that glass substrate, which carried out afterbaking calcination, applied the sealing compound subsequently to one side of two glass substrates, applied the spacer to this substrate or the substrate of another side, and performed registration and which afterbaking calcination is carried out and is sealed is required.
Although heat treatment of such a glass substrate is carried out by making a glass substrate mount on a tray (palette) generally, and conveying the inside of a heat chamber, a very high air cleanliness class is required as the short circuit of a circuit, etc. not arising so that surface discontinuity may not be produced in that case. However, in the conventional continuation heating apparatus, a band-conveyor type, a push-rod type, etc. are adopted as a transportation means of the tray which accommodated the processed material, For this reason, the sliding part existed unescapable, it was generated by worn powder by sliding with the elements of a transportation means or a transportation means, and a tray, and there was a problem which atmosphere is disturbed by that worn powder or is soiled. Since continuation heating apparatus was horizontal and was enlarged, while the large installing space was taken, capacity became large and the clean room also had that a purge is also large-sized, then a problem to say.
This person inserts into a furnace the tray which accommodated glass substrates by parallelogram movement of a walking beam in Japanese Patent Application No. No. 177754 [four to] as this measure, A tray is accumulated on a height direction in the shape of multi stage one by one according to the elevator mechanism for a rise here, The device switches the top tray, carries out parallel translation without relative sliding with a mechanism, and makes it descend, putting in the shape of multi stage one by one according to the elevator mechanism for descent, and it was made to make move the tray of the bottom out of a furnace by the above-mentioned movement of a walking beam was proposed. Since sliding of a tray transportation system and generating of the dust resulting from it were prevented by this, it came out to often perform heat treatment and thermoforming in a clean atmosphere, and it became possible.
[0003]
However, in the above-mentioned advanced technology, there is no indication about cooling of the heated glass substrates, and glass substrates were only carried out to the unloader mouth in the state where it mounted on the tray. For this reason, it has big calorific capacity, and since the temperature of glass substrates does not fall unless it sets sufficient radiational-cooling time by an unloader mouth, it is inseparable from a tray. Since it becomes being stopping the operation of a tray circulator style until the temperature of glass substrates falls in order that a vacant tray's may move the inside of a furnace to the loader side, Since decline in the efficiency of the whole heat-treatment system was caused and a large radiational-cooling space was needed, the device became large-sized, and further, since authorized personnel

glass substrates heated by not less than 200 ** raise ****, a notch, etc. by the thermal shock and thermal strain by quenching, and the fault that an inferior-goods incidence rate increases arises.
As for glass substrates, the upper and lower sides and right and left are strictly decided from structure, a function, etc.
Directivity must not change until a whole process finishes.
On the other hand, heating of glass substrates is carried out for every processes, such as desiccation after washing, baking of an orienting film, desiccation after rubbing, and desiccation of a sealing compound, is dedicated to a multi stage-like storage box for every process, and is taken out at the following process after this. However, since it is only taken out by the unloader mouth with a tray in the advanced technology, It was easy to produce an inconsistency in the directivity of glass substrates by authorized personnel's failure, after directivity had changed, it was dedicated to the storage box, and there was a problem that it is complicated by the time it moves to a next process, and direction correction which time requires had to be made.
[0004]
Were originated in order that this design might cancel the above problems, and the 1st purpose, It adds to the ability of heat treatment and thermoforming of glass substrates for generating of sliding and the dust resulting from it to be prevented, and to be well performed in a very clean atmosphere, Glass substrates are appropriately cooled by a small space for a short time, without making troubles, such as **** and a notch, cause, and it is in providing the continuous-heat-treatment device of the glass substrates which can attain [taking out] promotion of efficiency for facilitating and a heat treatment cycle.
In addition to the above, the 2nd purpose of this design can give and unload the directivity of regulation of glass substrates, and there is in providing the continuous-heat-treatment device of glass substrates which can work a next process well smoothly.
[0005]
[Means for Solving the Problem]
A rise elevator mechanism which carries out rise loading of the tray which mounted glass substrates in a furnace body to which this design has an entrance and an exit right and left in order to attain the 1st purpose of the above one by one, While arranging a downward elevator mechanism to which a tray is dropped one by one maintaining a loading state in the shape of parallel, in the upper part of a furnace body. A tray rise-and-fall change mechanism which **** a tray of the loading top which went up by a rise elevator mechanism, carries out the horizontal transfer of this and is made to **** on a tray of the loading top of a downward elevator mechanism is formed, An upper part walking-beam mechanism in which a tray which mounted glass substrates on a relation position which crosses the lower part of a furnace body with said both elevator mechanisms is conveyed from an entrance to an outlet direction, A bottom walking-beam mechanism in which a vacant tray is conveyed in the direction of an entrance from an exit is formed, To said furnace body, form an annealing mechanism of a zone atmosphere controlled circulation type in half the bottom of a downward elevator mechanism, and further in an outlet line of a furnace body. A traversing mechanism which separates glass substrates while carrying out a **** substitute from an upper part walking-beam mechanism, A glass substrate cooler style which mounts glass substrates and cools this directly, and a glass substrate taking over moving mechanism which transports the glass substrates separated by said traversing mechanism to a glass substrate cooler style are established.
In order to attain the 2nd purpose, this design forms the glass substrate extractor style L which carries out horizontal inversion of the glass substrates to a terminal of an outlet line of a furnace body, and sends it out to it.
In this design, "glass substrates" contains a flatness-like electronic circuit board etc. further a light filter besides a glass substrate etc.
[0006]
[Example]
The example of this design is described based on an accompanying drawing below.
Drawing 1 thru/or drawing 3 show one example by this design, and drawing 4 thru/or drawing 23 show the details.
A is the furnace body built with thermal insulation etc., by the frame, it is supported by the desired height level and the entrance a and exit a' are provided on the same axle at lower both sides. Exit a' also leads in the furnace via the tubed exit region through the inside of a furnace via the inlet area where the entrance a makes tubed [of length as required]. The furnace body has the capacity which may be accumulated on a height

In the furnace body A, the partition 2 of the shape of a vertical tube is formed. This partition 2 has the middle length partition 200 which divides between the tray rise side and the tray descent side, Therefore it has outside length partition 200' which reaches an inner wall of the kiln like drawing 4 in the middle length partition 200 and homotopic, ventilation space is formed between inner walls of the kiln like drawing 2 thru/or drawing 4 at the tray rise and tray descent side, respectively.
Furthermore, these ventilation space is divided by two or more horizontal partitions 201,201 like drawing 2 and drawing 3 in a sliding direction, and two or more ventilation space by the side of a tray rise and ventilation space by the side of tray descent are divided by the stage (what [is illustrated] three steps) by this, respectively.

The circulation stirring fan 3 is formed in the ventilation space of the necessary stage at the 1 side, respectively from the ventilation space of the whole page by the side of a tray rise, and the upper row by the side of tray descent.
While the blowing-in mouth 4 with a heat-resistant filter is formed in the partition 2 of the position displaced 90 degrees with the circulation stirring fan 3, The heater 1 is allocated in the field which the blast area 5 is formed in the position which stands face to face against this, and results in the blowing-in mouth 4 with a heat-resistant filter from the delivery of the circulation stirring fan 3 at least.
The atmosphere of required temperature divides with the drive of the heater 1, calorific value, and the circulation stirring fan 3 from the blowing-in mouth 4 with a heat-resistant filter by this, and it is sent into the space for conveyance in two, After circulating to the opening of each tray T of the letter of loading, from the blast area 5, the circulation stirring fan 3 absorbs and controlled circulation is carried out to it.
on the other hand — the tray descent side — lower — half a step — that is, the annealing mechanism P is formed in the ventilation space of the bottom at least. First this annealing mechanism P like drawing 3 and drawing 4 The circulation stirring fan 3 by the side of the ventilation space 1, It has this and the transverse partition 41 which reaches an inner wall of the kiln from the method of the back of the blowing-in mouth 4 with a heat-resistant filter provided in the partition 2 of the position displaced 90 degrees, the blast area 5 of a position which stands face to face against this, and the blowing-in mouth 4 with a heat-resistant filter.And in the partition 2 corresponding to the horizontal partition 201 of the ventilation space concerned, the heat shield plate 410 of the shape of an inner flange projected inside in the limit where passage of the tray T is allowed is formed, and this divides the tray descent side space and he is trying to reduce the thermal effect from the adjoining zone for heating.
It had an insulating function, the ventilation space concerned all did not come out, and said transverse partition 41 has divided the required range, for example, the range from the discharge side of the circulation stirring fan 3 to outside length partition 200', to the upper zone p and lower zone p'. And the water-cooled piping 42 with a fin is arranged at lower zone p' at the range which results in the method of the back of the blowing-in mouth 4 with a heat-resistant filter.
The water-cooled piping 42 has reached the level below the tray support later mentioned like drawing 3.
The both ends of the water-cooled piping 42 are connected to the water cycle system 420 besides a furnace.
On the other hand, the heater 43 of a sheathed type with a fin is allocated by the range which results in the method of the back of the blowing-in mouth 4 with a heat-resistant filter like the upper zone p, and it is connected with the cooking temperature control system which the exterior does not illustrate.
B is box-like covering surrounded so that the processing chamber of a necessary size may be formed in the surroundings of the furnace body A, said — an entrance — a — the same axle — a top — a side attachment wall — a position — **** — a processed material — ****** — a glass substrate — a class — W — a charging hole — b — providing — having — an exit — a — ' — the same axle — a top — a side attachment wall — **** — heat treatment — having finished — a glass substrate — a class — W — an extraction mouth — b — ' — providing — having — **** . Needless to say, box-like covering is installed in a clean room and, in the processing chamber, the exhaust air and controlled atmosphere of the high grade are filled via the filter etc.
[0007]
The tray T is a jig which mounts the glass substrates W, and mechanical strengths, such as a stainless plate, are constituted by flat-surface rectangular shape with a good material. As shown in drawing 10 thru/or drawing 15, the support 6 of desired height is formed in each corner for the tray T to be stabilized, and for multi stage loading to be performed, and make it a heated atmosphere circulate uniformly in the state

thickness which touch the part I object 6a which has the flange 600 which touches the undersurface of the tray T, and the upper surface of the tray T, and is screwed in the part I object 6a, The crevice and heights for positioning are prepared for the end face of the part I object 6a, and Itabe 601 of the part II object 6b.
In said tray T, two or more sets of holes t1, t2, and t3 are provided at the predetermined intervals like drawing 10. t1 is a hole for positioning for washing, and is allotted to the position near each strut 6 at equal intervals. t2 is the tooling holes for a traverse, and is allotted to the inside position at equal intervals in crosswise rather than said tooling holes t1 for washing. t3 is a hole for glass substrate rise and fall, and is on the same line in said tooling holes t2 for a traverse, and the cross direction, and is allotted to the inside position by at equal intervals in the length direction. This hole t3 for glass substrate rise and fall serves also as tooling holes simultaneously.
In drawing 11, the tray T has 2 sets of holes t3 for glass substrate rise and fall at a time right and left from the center. This is for mounting the two glass substrates W also simultaneously and heat-treating it.
[0008]
U is a rise elevator mechanism and is arranged to the field near an inlet area like drawing 2. D is a downward elevator mechanism and is arranged said rise elevator mechanism U and in the shape of parallel to the field near an exit region. V is a rise-and-fall change mechanism arranged at the relation which crosses said both elevator mechanisms in the upper region of a furnace body.
C -- the exit a from the entrance a -- 'the upper part walking-beam mechanism and C which have been arranged by the relation which crosses said both elevator mechanisms in between' -- the same -- exit [from the entrance a] a' -- it is a bottom walking-beam mechanism arranged by the relation which crosses said both elevator mechanisms in between.
The glass substrate charging machine style by which E has been arranged in the charging hole b, the glass substrate taking over moving mechanism which F receives the glass substrates W from said glass substrate charging machine style E, and is transported to the upper part of an inlet line, i.e., an upper part walking-beam mechanism, G is an entrance-side traversing mechanism which receives the tray T from bottom walking-beam mechanism C', and is made to transport to the upper part walking-beam mechanism C. Although the entrance-side traversing mechanism serves as a means to move a tray in the direction parallel to an inlet line again, in this example, it is not limited to this.
Although H is a tray soaping-machine style arranged if needed in the processing chamber of the side of exit a' and it is arranged like drawing 1 in this example at every one both sides of an outlet line, only one side is.
J is an outlet side traversing mechanism for receiving the tray T from the upper part walking-beam mechanism C in an outlet line, and making it **** to bottom walking-beam mechanism C'. Although outlet side traversing mechanism J receives the tray T and enables it to carry out parallel translation between an outlet line and the tray soaping-machine style H in this example, it is not limited to this.
The glass substrate extractor style by which L has been arranged at extraction mouth b', the glass substrate cooler style by which K was provided on the outlet line of the upstream from the glass substrate extractor style L, M is a glass substrate taking over moving mechanism for receiving glass substrates from outlet side traversing mechanism J, and transporting to the glass substrate cooler style K and the glass substrate extractor style L one by one.
[0009]
In the upper level, rise elevator mechanism U has a little two or more tray support 7 which can rotate freely around a perpendicular axis from the ascending position of the upper part walking-beam mechanism C shown in drawing 2. In what is illustrated, the number of these tray support 7 is four.
Like drawing 10, drawing 14, and drawing 15, for example, width differs from a linear dimension, it is constituted as the plate of rectangular form thru/or a block, respectively, When a long piece turns to an inner direction, it supports, the corner bottom 600, i.e., the support flange, of the tray T, and a long piece rotates 90 degrees, for example, a support of the tray T can be canceled.
The slot 700 which engages and releases the part I object 6a of the support 6 from width is formed near the free end of the tray support 7. Said tray support 7 is attached to the upper bed of two or more support rods (a drawing 4) 701 which pierce through a hearth and are extended from the lower part of the furnace body A like drawing 2 and drawing 3.
Each support rod 701 has middle held to the rib 702 constructed across horizontally under the hearth c, A lower end is supported movably by the bearing provided in the base frame, the rotating element 703, for example, BEBERUGIYA, is attached near the bearing, and he is trying to drive all at once by the rotary

Kazumoto.
[0010]
Rise elevator mechanism U is further located in a lower level rather than a **** side at the time of the rise of the collimated beams 12 and 12 which the upper part walking-beam mechanism C mentions later in a low rank, i.e., a normal state, rather than said tray support 7, The tray rise implement 9 which receives the tray T at the time of descent of the collimated beams 12 and 12, and is raised toward said tray support 7 is allotted.
Said tray rise implement 9 consists of couples at least, is seen from the side side, and is allotted inside said support rod 701 (in the transverse-plane side, it is on the same vertical plane mostly with the support rod 701 like drawing 3). Each tray rise implement 9 makes plate shape thru/or the shape of a nail, it has the support 900 of the shape of a boss over the support 6 of the tray T in a tip part, and, as for the support 900, the heights of the support end face have a **** crevice.
The tray rise implement 9 is being fixed to the upper bed of two or more sets (a drawing 2 sets) of supporting shafts 901.
The supporting shaft 901 has the tray rise implement 9 in a low rank rather than the upper limit position of the upper part walking beam C in a normal state, it pierces through the hearth c, is extended in a furnace, and is connected with drive mechanism so that even the neighborhood level of the tray support 7 can go up and down like drawing 15 from this level.

In this example, to the supporting shaft 901, it pierces through the rib 702, is extended, and is combined by the connecting plate 902, and that connecting plate 902 is operated by the actuator 903 for rise and fall. Although the oil hydraulic cylinder of the actuator 903 for rise and fall, etc. are arbitrary, in this example, a motor is used, the ball screw axis 904 connected with that output side is held by a bearing at the rib 702, and the female screw member 905 fixed to the ball screw axis 904 at the connecting plate 902 is screwing.
Upwards, fixed tray support 8' is provided via the middle frame 10 from the height direction middle of an inlet area and an outlet area like drawing 9. It is for this fixed tray support 8' supporting the tray which consisted of two or more pins or a parallel plate, and was inserted in from the entrance a by the upper part walking-beam mechanism C, and the tray T before being carried to exit a' from the inside of a furnace at the time of descent of the upper part walking-beam mechanism C.
In an inlet area, an outlet area, and each hearth part of a rise elevator mechanism lower part and a downward elevator mechanism lower part, the fixed tray support [lower than the rise level of the collimated beams 17 and 17 of bottom walking-beam mechanism C'] 8 higher than a downward level is arranged.
In the case of parallelogram movement of bottom walking-beam mechanism C', a tray is ****(ed) in each position.

[0011]
The composition of downward elevator mechanism D is the same as said rise elevator mechanism U, Tray support 7' which rotates 90 degrees or more around a perpendicular axis, and can cancel a support of the tray T while being arranged slightly in [upper limit level / of the upper part walking-beam mechanism C / in a higher rank] interval and supporting the tray T in the shape of loading, It has tray downward implement 9' raised toward tray support 7', being in a low rank and supporting the tray T rather than this tray support 7'.
These tray support 7' and tray downward implement 9' give numerals with a comma to the same portion structurally similarly to rise elevator mechanism U therefore, and explanation is omitted.
Although the tray rise implement 9 and tray downward implement 9' are used in this example as a tray support by the position of rise elevator mechanism U and downward elevator mechanism D, of course depending on the case, a fixed tray support may be established via the middle frame 10. In this case, the tray rise implement 9 and tray downward implement 9' stand by on a lower level more moderately than a fixed tray support.
[0012]
Next, the tray rise-and-fall change mechanism V is a means for receiving the top tray loaded by said rise elevator mechanism U, and carrying out the crossfeed of this to the top tray currently loaded into downward elevator mechanism D.
It collaborates with rise elevator mechanism U and downward elevator mechanism D, walking-beam movement is performed, and a tray is ****(ed), without being accompanied by sliding.

drawing 3 The two cross beams 11 and 11 in which a mutual interval is somewhat larger than the width of the tray T, It is fixed to these cross beams 11 and 11, respectively, and has the tray receptacle implement 110,110 with the size which projects in a tray T width dimension, and a driving means to which an axial direction is made to carry out right back-migration of the two cross beams 11 and 11 according to a predetermined program.
Although the driving means is arbitrary, While constructing across horizontally the ball screw screw thread 113 by which ****s in this example, has adopted the delivery method, and fixes the stand 112 to outside or box-like covering of the furnace body A, and a drive revolution is carried out to this by the motor 111, The female screw member 114 combined with the back end of the cross beams 11 and 11 is screwed in the ball screw screw thread 113.
And the slider 115 is formed in the tip side of the cross beams 11 and 11, and it is guided by guide-block 112' fixed to outside or box-like covering of the furnace body A. Said partition 2 has a window hole so that the cross beams 11 and 11 and the tray T can move freely.
[0013]
Next, the upper part walking-beam mechanism C makes the tray T transport [by parallelogram movement of rise-advance-downward-retreat clockwise] to an inlet area and a rise elevator mechanism part through the entrance a from an inlet line in operation, They are an exit region and a thing for subsequently taking out to an outlet line via exit a' about the tray of the loading lowest by which downward delivery has been carried out by downward elevator mechanism D. On the other hand, it is for bottom walking-beam mechanism C' carrying out the return of the vacant tray T which separated the glass substrates W by [of rise-advance-downward-retreat] carrying out parallelogram movement counterclockwise to the inside of an exit region and a furnace, and an inlet area pan via the entrance a in an inlet line from an outlet line.
First, the upper part walking-beam mechanism C has the two collimated beams 12 and 12 of the length which penetrates the entrance a and exit a'. In detail, the collimated beams 12 and 12 are in a level always low in said tray support 7 and 7, and crosswise, it is in the inside position of support rod 701,701' like drawing 3, and a mutual interval is in a size smaller than the width of the tray T. Longitudinal direction both ends are preferably connected by the rib, respectively, and the collimated beams 12 and 12 serve as long frame shape as a whole.
It is constructed by the frame F of an inlet line and an outlet line via the stand just under the collimated beams 12 and 12 thru/or at the method of the bottom, respectively in the guide rails 13 and 13 of 2 lots. In the jacks 14 and 14 of the oil pressure controller [guide rails / 13 and 13 / these] or the mechanical cable type, it is attached so that sliding is possible two right and left at a time, Each [of the jacks 14 and 14] actuating rod is connected with the overhang member attached to the longitudinal direction end of the collimated beams 12 and 12 thru/or this, Therefore, only the size to which the collimated beams 12 and 12 attain a few upwards from the tray rise implement 9 or the upper surface of tray downward implement 9' rises by the synchronous operation of the jacks 14 and 14.
And the ball screw axis 160 by which a drive revolution is carried out by the motor 16 via a bracket, respectively is ****(ed) by the two guide rails 13 of one side (this example the inlet line side), The female screw member which was fixed to the base of the jack 14 and which is not illustrated is engaging with the ball screw axis 160. Therefore, the collimated beams 12 and 12 are stroked so that it may be in the state where it projected to the outlet line as the synchronous drive of the motor 16 showed to drawing 1 and drawing 2 from the state projected to the inlet line side.
[0014]
Bottom walking-beam mechanism C' also has the two collimated beams 17 and 17 which penetrate the entrance a and exit a' similarly, and is making long frame shape preferably. These collimated beams 17 and 17 are in a lower order level rather than said tray rise implement 9 (tray downward implement 9'), and, crosswise, are always inside the fixed tray receptacles 8 and 8 like drawing 3 in a height direction.
In an inlet line and an outlet line, to directly under [of the collimated beams 17 and 17], or the method of the bottom (all are the insides [guide rails / 13 and 13 / said]). The guide rail of 2 lots is constructed via said stand, and in the hydraulic or mechanical jacks 18 and 18, it is attached to these guide rails so that sliding is possible two right and left at a time. Each [of the jacks 18 and 18] actuating rod is connected with the longitudinal direction end of each collimated beams 17 and 17, therefore only the size to which the collimated beams 17 and 17 result in the upper level for a while from the upper bed of the fixed tray support 8 rises by the synchronous operation of the jacks 18 and 18

was fixed to the ball screw axis 190 in the base of the jack 18 and which is not illustrated is being engaged. Therefore, the lower collimated beams 17 and 17 are stroked so that it may be from the state protruding to an outlet line in inlet line state protruding as shown in drawing 2 by the synchronous drive of the two motors 19.
[0015]
The glass substrate charging machine style E is a means which draws the glass substrates W from the charging hole b, and draws this, and is raised in a position.
It is extended in the direction of a furnace body entrance from the nearest to the charging hole b of the box-like covering B, and is provided in the level almost equivalent to the collimated beams 12 and 12 of the upper part walking-beam mechanism C like drawing 2 and drawing 8 in the height direction as shown in drawing 1 and drawing 5.
The glass substrate charging machine style E in this example. arrange the multi-thread band conveyor 21 which set the O ring belt etc. as the interval narrower than the width of the glass substrates W to the stand 20 supported on the frame etc., and a PENSHIN type etc. push up to it near the multi-thread band conveyor 21 — business — the cylinders 22 and 22 are arranged.
pushing up — business — the number of the cylinders 22 and 22 being at least four (when processing concurrently the glass substrates W of two sheets, it is at least eight), and, It pushes up, and the pin 220 is arranged at the interval to which the phase shifted from both said hole t1 of the tray T t2 and t3, respectively, and is on a low-ranking level from the tension side of the multi-thread band conveyor 21 in a normal state.
[0016]
The glass substrate taking over moving mechanism F is a means for ****(ing) the glass substrates W which said glass substrate charging machine style E pushed up, and were raised by the pin 220, and moving to an inlet line (stroke position of the up-and-down collimated beams 12, 12, 17, and 17).
It is shown in drawing 1, drawing 2, drawing 5, or drawing 8.

The parallel guide rails 23 and 23 of two sections constructed so that this glass substrate taking over moving mechanism F might be extended in the direction of a furnace body entrance from the nearest to the charging hole b of the box-like covering B, It was allotted in parallel with the shape of a nail or the tabular supports 24 and 24 which were attached to these parallel guide rails 23 and 23 with the base 240 so that sliding was possible, and the parallel guide rail 23, and has the ball screw 25 which **** the base 240 of the support 24, and the motor 251 which drives this.
The parallel guide rails 23 and 23 have an interval larger than the width of the tray T like drawing 5, The bearing surface of the supports 24 and 24 is projected so that the both-sides undersurface of the glass substrates W can be supported, And it is in a level higher than the tension side of said multi-thread band conveyor 21, and the rise level of the collimated beams 12 and 12, The supports 24 and 24 can reciprocate freely between front ****** shown with the glass substrate charging machine style right above position (taking over position) shown as the solid line of drawing 4 by the drive of said motor 251, and an imaginary line.
[0017]
Fundamentally, although entrance-side traversing mechanism G is an elevator means raised in order to receive the tray by which the return was carried out by bottom walking-beam mechanism C' and to make it **** in the upper part walking-beam mechanism C, In addition, it serves also as the means on which collaborate with said glass substrate taking over moving mechanism F, and the tray T is made to mount the glass substrates W.

It serves also as a means to supply a still newer tray or the repaired tray to a heat treatment line from the exterior, in this example.
Entrance-side traversing mechanism G follows and in this example like [rise and fall are possible, and parallel translation is possible, and] drawing 1, drawing 2, drawing 5, and drawing 8, The charging hole wall surface of the box-like covering B, and the lateral guide rails 27 and 27 of the upper and lower sides constructed across horizontally by the beam frame 26 of parallel state, it had the female screw member 280 screwed in the ball screw 29 which it was held with regions of back at these lateral guide rails 27 and 27 so that sliding was possible, and was constructed across horizontally between the lateral guide rails 27 and 27 — with 28 the 1st frame. The motor 281 for crossfeeds which drives the female screw member 280, it had the female screw member 320 screwed in the ball screw 31 which was held with regions of back at the vertical guide rails 30 and 30 provided in the anterior part side of 28 the 1st frame so that sliding was possible, and ****(ed) to the

and it is extended to near the other side wall b_1 of the box-like covering B in the longitudinal direction. Only in the case of a rise-and-fall function, the vertical guide rails 30 and 30 are fixed by the beam frame 26.
The parallel arms 33 and 33 are narrower than interval L_1 of the collimated beams 12 and 12 of the upper part walking-beam mechanism C like drawing 5, An interval larger than interval L_2 of the collimated beams 17 and 17 of bottom walking-beam mechanism C', Namely, it has interval L_3 corresponding to the hole t1 for positioning, and the hole t3 for glass substrate rise and fall at the time of the tray traverse of the tray T, Furthermore, the parallel arms 33 and 33 are pushed up at the interval which the projection 331,331 for positioning is formed in the upper surface, i.e., a tray **** side, at the interval corresponding to the hole t1 for positioning of a tray for a traverse, and agrees in the hole t3 for glass substrate rise and fall, and the pin 330,330 protrudes. the case of the tray of drawing 11 -- drawing 12 --- like --- every four one side --- it pushes up and the pin 330 is formed.
The parallel arms 33 and 33 are located in a lower level in a normal state more moderately than the **** side of the collimated beams 17 and 17 (ascending position) of bottom walking-beam mechanism C', The stroke which goes up by the drive of said motor 321 for vertical feed on a level higher than the **** side of the collimated beams 12 and 12 (falling position) of the upper part walking-beam mechanism C is set up. As long as the parallel arms 33 and 33 have a crosswise interval which does not collide with the glass substrate charging machine style E at the time of said rise, horizontal form may be sufficient as them, but in this example, the level difference is provided in the height direction so that it may not collide with the glass substrate charging machine style E at the time of a rise.
After the parallel arms 33 and 33 has been carried out [parallel translation of the 1st frame] to drawing 1 by movement of 28 near the other side wall b_1 of the box-like covering B like drawing 4, in order that a new tray or a repaired tray can be taken in to a processor, The tray loading slot 34 which can be freely opened and closed to a sliding type or a hinge style is established in other side wall b_1.
The driving means for axial direction movement of the collimated beams 12, 12, 17, and 17 of the rise-and-fall driving means of entrance-side traversing mechanism G and outlet side traversing mechanism J mentioned later and the upper part, and the bottom may not be limited to a ball screw type like an example, but may be a hydraulic cylinder type etc.
[0018]
The details of the tray soaping-machine style H, outlet side traversing mechanism J, the glass substrate cooler style K and the glass substrate extractor style L, and the glass substrate taking over moving mechanism M are shown in drawing 16 thru/or drawing 22.
In this example, the number of the tray soaping-machine styles H is two.
It has the tray rising and falling mechanism 36 for ****(ing) the cleaning tank 35 installed on the frame of the side of a furnace body outlet line, respectively, and the tray T which was installed near this and conveyed by outlet side traversing mechanism J, and making the cleaning tank 35 immerse.
As for the cleaning tank 35, the penetrant remover 351 is filled and the ultrasonic wave oscillator 350 is attached to proper places, such as an inner bottom.
The stand 360 with which the tray rising and falling mechanism 36 was set up by the position by the side of an anti-outlet side traversing mechanism, The slide 364 which has the female screw member 363 screwed in the ball screw 362 which was held with regions of back at the vertical guide rail 361,361 provided in the stand 360 so that sliding was possible, and ****(ed) between the vertical guide rails 361,361, It has the motor 365 which drives the ball screw 362, and the parallel arms 37 and 37 fixed to the anterior part of this slide 364.
an interval with said parallel arms 37 and 37 large in the parallel arms 33 and 33 which outlet side traversing mechanism J mentions later like drawing 1 --- that is, It has an interval corresponding to the tooling holes t1 for washing of the above mentioned tray T, and the gage pin (a projection may be sufficient) 370,370 corresponding to the tooling holes t1 for washing is protruded on a **** side.
[0019]
Are an elevator means which carries out descending movement so that outlet side traversing mechanism J may receive the tray T taken out in the outlet line and may make bottom walking-beam mechanism C' **** with the upper part walking-beam mechanism C fundamentally, but. In addition, it has the function to collaborate with the glass substrate taking over moving mechanism M, and to separate the tray T with glass substrates. In this example, the crossfeed of the vacant tray which separated glass substrates is carried out

This outlet side traversing mechanism J is the same structure as said entrance-side traversing mechanism G. Namely, the lateral guide rails 27 and 27 of the upper and lower sides constructed horizontally across beam frame 26' of the extraction mouth wall surface of the box-like covering B, and parallel state. being held with regions of back, in these lateral guide rails 27 and 27, so that sliding is possible — and the lateral guide rails 27 and 27 — with 1st frame 28' provided with female screw member 280' screwed in ball screw 29' constructed across horizontally in between. Motor 281' for crossfeeds which drives female screw member 280', 2nd frame 32' provided with female screw member 320' screwed in ball screw 31' which was held with regions of back in the vertical guide rails 30 and 30 provided in the anterior part side of 1st frame 28' so that sliding was possible, and ****(ed) in the vertical guide rails 30 and 30, a female screw member — 320 — ' — driving — vertical feed — ** — a motor — 321 — ' — the — two — a frame — 32 — ' — a base — fixing — having had — two — a ** — a parallel arm — 33 — ' — 33 — ' — from — becoming — **** .
It is in a low rank in the lateral guide rails 27 and 27 from said glass substrate extractor style L and the glass substrate cooler style K, and is extended in the longitudinal direction to near order [the box-like covering B] side-attachment-wall b_1 and the b_2.

It is narrower than the interval of the collimated beams 12 and 12 of the upper part walking-beam mechanism C like drawing 17 in the parallel arms 33 and 33, and larger than the interval of the collimated beams 17 and 17 of bottom walking-beam mechanism C'. That is, it has an interval corresponding to the hole t1 for positioning of the tray T for a traverse, and the hole t3 for glass substrate rise and fall. The interval which is established in the projections 331 and 331 for positioning of the interval which agrees in a tray **** side in the parallel arms 33 and 33 at the tooling holes t1 for a traverse, and agrees in the hole t3 for glass substrate rise and fall pushes up, and it protrudes in the pins (or projection) 330 and 330.
In a normal state, it is located in a lower level more moderately than the upper surface of the collimated beams 17 and 17 (ascending position) of bottom walking-beam mechanism C' in the parallel arms 33 and 33, The stroke which goes up on the level higher than the upper surface of the collimated beams 12 and 12 (ascending position) of the upper part walking-beam mechanism C at the time of the drive of said motor 321' for vertical feed is set up. It has a level difference in the height direction so that it may not collide with the glass substrate cooler style K in the parallel arms 33 and 33 at the time of said rise.
Although parallel translation is carried out to the tray soaping-machine style H by movement of 1st frame 28' in the parallel arms 33 and 33, The tray soaping-machine style H is close to order [the box-like covering B] side-attachment-wall b_1 and b_2, and there, The tray output port 38 and 38 which can be freely opened and closed to a sliding type or a hinge style is formed in the other side wall b_1 and b_2, and it enables it to collect the trays which it does not continue [the washed tray or] not washing.
[0020]
The glass substrate cooler style K and the glass substrate extractor style L by which it is characterized about this design are arranged on the outlet line like drawing 1 and drawing 16 at series shape.
First, it is for the glass substrate cooler style's K cooling quickly the glass substrates W by which annealing was carried out with the above mentioned annealing mechanism P, promoting a temperature reduction, and smoothly often performing insertion to taking out from a device, and storage box Q (drawing 23, 24 references).
The glass substrate cooler style K consists of the cool box 39 fixed to the height level almost equivalent to the collimated beams 12 and 12 (ascending position) of the upper part way king beam mechanism C like drawing 14 by the support means 390 which rises from ****, In the upper part, it has the mounting cooling surface 394 which consists of stainless plates etc., and the refrigerants 393, such as water, are filled by the service pipe 391 and the drainage pipe 392 in a box, and it circulates between external supply sources.
And the glass substrates moved to right above by the glass substrate taking over moving mechanism M mentioned later are surfaced and dropped to the prescribed position of the cool box 39, and the ascending and descending means 40 for making it rise to surface from a mounting cooling surface is attached to it after cooling.
In a normal state, the actuating rod 400 is on the level below the mounting cooling surface 394 of the cool box 39.
Although the number of the ascending and descending means 40 is four in drawing 19, in cooling the glass substrates of two sheets simultaneously, it provides four places at a time 2 sets.
Although it is for the glass substrate extractor style L taking out the cooled glass substrates out of a device

If it explains in full detail, the glass substrate extractor style L is extended from extraction mouth b' of the box-like covering B to the method of outside as a whole, and is provided in the level almost equivalent to said cool box 39 in the height direction. First, the glass substrate extractor style L. said — a glass substrate — a class — a charging machine — a style — E — the same — a frame — etc. — supporting — having had — a stand — 20 — ' — an O ring — a belt — etc. — a glass substrate — a class — W — an interval — narrow — having taken — two — a set — multi-thread — a band conveyor — 21 — ' — 21 — ' — an outlet line — a direction — moderate — an interval — placing — series shape — arranging — **** . And the cradle 44 provided with the arm part 440,440 which is extended to those longitudinal directions and projected crosswise in the middle among the multi-thread band conveyors 21 and 21 is allotted.
This cradle 44 is supported by the actuator 45 for reversal formed in the center-section lower part.
The cradle 44 is held rather than the conveyance face of the multi-thread band conveyors 21 and 21 like drawing 21 in a normal state at the low-ranking level.
Although the robot cylinder which can be rotated [that rise and fall are free and] freely is used in this example, the actuator 45 for reversal, Not the thing limited to this but the thing (for example, thing which was used for said tray support or a tray rise implement) of the mechanical form which combined each motor the object for the upper and lower sides and for rotation may be used.
In order to prevent a position gap of glass substrates at the longitudinal direction end of the cradle 44, and the end of the arm part 440,440, it has the rising portion 441, respectively.
[0021]
The glass substrate taking over moving mechanism M collaborates with said outlet side traversing mechanism J from the tray T (assembly tray which glass substrates are mounting) transported by the upper part walking-beam mechanism C, and separates glass substrates, It is a means for ****(ing) this and making it move one by one right above the glass substrate cooler style K and the glass substrate extractor style L.
The parallel guide rails 23 and 23 of two sections constructed so that this glass substrate taking over moving mechanism M might be extended from the side of the glass substrate extractor style L to a furnace body outlet direction. them — parallel — a guide rail — 23 — ' — 23 — ' — a base — 240 — ' — having — sliding — possible — attaching — having had — a nail — ** — or — tabular — a support — 24 — ' — 24 — '. parallel — a guide rail — 23 — ' — parallel — allotting — having — a support — 24 — ' — a base — 240 — ' — ****(ing) — a ball screw — 25 — ' — this — driving — a motor — 251 — ' — having — **** .
It has an interval larger than the width of the tray T like drawing 16 in the parallel guide rails 23 and 23, The bearing surface of the supports 24 and 24 is projected so that the both-sides undersurface of the glass substrates W can be supported, And it is in a level higher than the tension side of said multi-thread band-conveyor 21', and the rise level of the collimated beams 12 and 12, It can reciprocate freely between the position of the glass substrate extractor style L shown in drawing 16 by the drive of said motor 251' in the supports 24 and 24, and the glass substrate cooler style K and a furnace body Deguchi outside position.
[0022]
An example is an example of this design, the glass substrate charging machine style E may be extended to the method of outside [charging hole / b / of the box-like covering B] depending on the case, and the glass substrate taking over moving mechanism F is extended like the glass substrate taking over moving mechanism M of an outlet side in this case by the method of outside.
Although the tray is made to **** in this example in the inlet area and exit region of the furnace body A, respectively, it puts into a heat treating zone promptly from the outside of an entrance, and may be made to take out out of Deguchi promptly from a heat treating zone.
Although outlet side traversing mechanism J is one set in this example, as the imaginary line of drawing 1 shows, it is good also as two sets. In this case, ball screw 25' and the motor 251 are common use, and when one side is in a cleaning tank position like the solid line of drawing 1, two-set traversing mechanism [of outlet sides] J is arranged so that another side may serve as an operation relation located on an outlet line.
[0023]
The initial set state is formed in operation. Although it is good also as a method of opening a part of furnace body wide, and packing a tray, this is simpler when the parallel translation of the entrance-side traversing mechanism G can be carried out to an inlet line like this example. That is, where 32 is dropped the 2nd frame, the crossfeed motor 281 is driven, and parallel translation of the parallel arms 33 and 33 is carried out to 28 to an inlet line like drawing 1 the 1st frame. Thereby, the holder of the parallel arms 33 and 33 is located near the tray loading plot 24.

interval corresponding to the tooling holes t2 for a traverse of the tray T, and agreed in the hole t3 for glass substrate rise and fall and the pin 330 is arranged, The tray T is pushed up with the projection 331, and is supported with sufficient stability to a regulation position by the pin 330. Then, the crossfeed motor 281 is reverse-driven in this state, and 28 and the parallel arms 33 and 33 are moved on an inlet line like the solid line of drawing 5 the 1st frame.
If the motor 16 of the upper part walking-beam mechanism C is driven in this state, the collimated beams 12 and 12 will carry out [at a falling position lower than the height level of the parallel arms 33 and 33] predetermined length projection in the inlet line of the furnace body A. Then, if it next operates in the jacks 14 and 14, the collimated beams 12 and 12 will go up, and the tray T ****(ed) by the parallel arms 33 and 33 by it is ****(ed) by the collimated beams 12 and 12. **** of the tray to the collimated beams 12 and 12 is good also as a form of once raising the parallel arms 33 and 33 by the vertical-feed motor 321 after moving to the line top of the parallel arms 33 and 33, and dropping the parallel arms 33 and 33 by the vertical-feed motor 321 after sternway of the collimated beams 12 and 12.
[0024]
Next, if the motor 16 is reverse-driven, the collimated beams 12 and 12 will move to an axial direction so that outlet line predetermined length projection may be carried out like drawing 2, Thereby, the tray T reaches an inlet area, and when the collimated beams 12 and 12 subsequently fall in downward moving of the jacks 14 and 14, the tray T is ****(ed) by fixed tray support 8'.
Parallel translation is carried out to the above mentioned tray loading slot 34, the following tray is put on the parallel arms 33 and 33 from the tray loading slot 34, and the parallel arms 33 and 33 are again conveyed by movement of the parallel arms 33 and 33 in an inlet line in the meantime.
When the collimated beams 12 and 12 act as sternway Noboru Gokami, the following tray from the parallel arms 33 and 33. The **** substitute of the precedence tray is carried out from fixed tray support 8' at the collimated beams 12 and 12, respectively, a precedence tray results in the position of rise elevator mechanism U by advance of the following collimated beams 12 and 12, and the following tray reaches an inlet area.
This tray is rise Helle, when a precedence tray reaches and the collimated beams 12 and 12 descend. If the collimated beams 12 and 12 descend as mentioned above, Since a backward tray is ****(ed) by fixed tray support 8' of an inlet area and the following tray is transported by reciprocation of the parallel arms 33 and 33 above in the meantime on the inlet line, When the collimated beams 12 and 12 go astern, go up - move forward, the tray of further the succession of a backward tray to rise elevator mechanism [from an inlet area] U is ****(ed) by the inlet area from an inlet line. The succession tray which resulted in rise elevator mechanism U is lifted via the support 6 as mentioned above by rise of the tray rise implement 9, and by going up still more, a succession tray contacts so that Itabe 601 may engage and suit the support 6 and uneven part of a precedence tray. ****(ing) each tray support 7 in this state -- a succession tray -- precedence Trey -- if it is together supported by the tray rise implement 9 and a succession tray goes up to said position, each tray support 7 returns to an actuated position again, a succession tray will be supported and the tray rise implement 9 will return to a former position.
Two trays will be in a laminating condition now.
[0025]
By repeating the above-mentioned cycle hereafter, from the outside, a tray is automatically transported into a furnace and is accumulated one by one. If the tray of a rise region is accumulated in this way to the height to which the top tray reaches under the rise-and-fall change mechanism V to a specified number, rise elevator mechanism U will stop an operation.
By and the coordinated movements of entrance-side traversing mechanism G and the upper part walking-beam mechanism C which were described above in this state this time. It is that to which a tray is further moved to the position of previous downward elevator mechanism D rather than a rise elevator mechanism U region, A tray is ****(ed) with the tray rise implement 9 of rise elevator mechanism U, subsequently to the collimated beams 12 and 12, is ****(ed) from the tray rise implement 9 at the time of the rise of the next cycle of the collimated beams 12 and 12, and results in downward elevator mechanism D by advance of this. The cooperation operation of tray support 7' and tray downward implement 9' is carried out like the above here. That is, downward elevator mechanism D is operated as a rise elevator mechanism.
If it carries out like this, a tray will be accumulated on a height direction one by one in a downward region, and the operation of downward elevator mechanism D will be stopped in the place where the tray reached the height to which the top tray reaches under the rise-and-fall change mechanism V to a specified number. Th

[0026]
And where rise elevator mechanism U and downward elevator mechanism D are stopped, the cooperation operation of entrance-side traversing mechanism G, the upper part walking-beam mechanism C and bottom walking-beam mechanism C', and the outlet side traversing mechanism J is carried out. The tray which this inserted from the tray loading slot 34 is transported to an inlet area-rise elevator mechanism region-downward elevator mechanism region-exit region-outlet line one by one by clockwise parallelogram movement. In an outlet line, the **** substitute of the tray is carried out by the rise of the parallel arms 33 and 33 of outlet side traversing mechanism J, or descent of the collimated beams 12 and 12 in the parallel arms 33 and 33 from the collimated beams 12 and 12, a parallel arm — 33 — ' — 33 — ' — a motor — 321 — ' — a drive — descending — a counterclockwise rotation — a parallelogram — movement — carrying out — the bottom — a walking beam — a mechanism — C — ' — a collimated beam — 17 — 17 — a falling position — an outlet side — projecting. Subsequently, the **** substitute of the tray is carried out from the parallel arms 33 and 33 by going up at the collimated beams 17 and 17. And a tray is sent into an exit region when the collimated beams 17 and 17 project in an entrance side, Hereafter, a succession tray is arranged by repetition of the cooperation cycle of the parallel arms 33 and 33 and the collimated beams 17 and 17 in a downward elevator mechanism lower part region-rise elevator mechanism lower part region-inlet area, respectively. And operation of bottom walking-beam mechanism C' and outlet side traversing mechanism J is stopped, and a tray is arranged in an inlet area, a downward elevator mechanism region, and an exit region with entrance-side traversing mechanism G and the upper part walking-beam mechanism C. Thereby, one is supported by fixed tray support 8' of an inlet area, one is supported by tray downward implement 9' of downward elevator mechanism D, and, as for a tray, one is ****(ed) by fixed tray support 8' of an exit region. One more tray is ****(ed) by the parallel arms 37 and 37 of outlet side traversing mechanism C', and a tray is ****(ed) by each four fixed tray supports 8 of the exit region, both elevator mechanism, and inlet area bottom in the return side, respectively. An initial state is completed above.
[0027]
It changes into the state where put the tray on the parallel arms 33 and 33, and entrance-side traversing mechanism G was moved on the inlet line like the imaginary line of drawing 5 in heat-treating glass substrates for desiccation, calcination, etc. in the state where the tray of required number of sheets has been filled up with and arranged as mentioned above. At this time, each projection 331 of the parallel arms 33 and 33 fitted into at least four tooling holes t2 for a traverse of the tray T, respectively, and it pushed up to at least four holes t3 for glass substrate rise and fall, and the pin 330 has penetrated. If the glass substrates W are inserted in from the loading slot b in this state, the glass substrates W will be drawn by the operation of the multi-thread band conveyor 21 of the glass substrate charging machine style E, and it will mount on the multi-thread band conveyor 21 like drawing 6 and drawing 8. pushing up in this state — business — if the cylinders 22 and 22 are operated — at least four — it pushes up, the pin 220,220 projects and the glass substrates W are lifted by horizontal form right above the multi-thread band conveyor 21 like the imaginary line of drawing 6.
Subsequently, if the motor 251 of the glass substrate taking over moving mechanism F is operated, The supports 24 and 24 located in furnace inlet slippage like the imaginary line of drawing 5 till then move to a left along with the ball screw 25, and it is right above the multi-thread band conveyor 21 like drawing 6, and is located downward more moderately than the undersurface of the crosswise flank of the glass substrates W. pushing up, if this is checked — business — the cylinders 22 and 22 carry out a downward operation, thereby, the glass substrates W support and it is ****(ed) by 24 and 24.
[0028]
Subsequently, if the motor 251 operates to the retreat side, the glass substrates W will be conveyed to right above the tray T ****(ed) by the parallel arms 33 and 33 like drawing 7. If the vertical-feed motor 321 operates in this state, the parallel arms 33 and 33 will also go up to one by the rise of 32 the 2nd frame. It pushes up by rise of the parallel arms 33 and 33, since it pushed up to the tray T and the pin 330 has penetrated, the pin 330 contacts glass substrates and supports like the imaginary line of drawing 7 and drawing 8, and desired height ****** is ****** in the glass substrates W from 24 and 24. It supports, when the motor 251 operates in this state, and 24 and 24 escape in the position of the charging machine style E. The collimated beams 12 and 12 (falling position) of the upper part walking-beam mechanism C project to the inlet line side (a drawing left) in this stage, and it results in the position just under the tray T. If the collimated beams 12 and 12 are raised in this state or 32 is dropped the 2nd frame by the drive of the vertical-feed

and fall of the tray T, glass substrates descend, while it has been level, storage mounting is carried out into the tray T, and glass substrates are automatically set now to the tray T.

[0029]

The insertion above-mentioned after this, and the upper part walking-beam mechanism C, bottom walking-beam mechanism C', The cooperation operation of rise elevator mechanism U, downward elevator mechanism D, the rise-and-fall change mechanism V and both traversing mechanism [of an entrance side and an outlet side] G, and J is performed, and by that cause, The crossfeed of the tray (an assembly tray is called below) of a glass substrate assembly state is carried out to rise elevator mechanism U through an inlet area from the outside of a furnace, being gone up and supported here -- from the bottom of a following tray -- accumulating -- atmosphere heating being carried out to prescribed temperature, and the inside of a furnace, going up one by one, Heating and annealing are carried out a crossfeed being carried out by the rise-and-fall change mechanism V, and the top tray of downward elevator mechanism D ****(ing), and descending the inside of a furnace one by one subsequently, if it reaches to predetermined height. In the meantime, the lowest tray is ****(ed) by the upper part walking-beam mechanism C by downward elevator mechanism D, and a tray is taken out through an exit region in the outlet line besides a furnace.

If the first assembly tray is taken out by the upper part walking-beam mechanism C from downward elevator mechanism D in an outlet line, in an outlet line, it will take over with outlet side traversing mechanism J, and will be separated into a tray and glass substrates by the moving mechanism M. A vacant tray has a lower region in a furnace backward feed [outlet side traversing mechanism J and bottom walking-beam mechanism C'] as it is. Or while a crossfeed is carried out by outlet side traversing mechanism J, being washed by the tray soaping-machine style H and returned to an outlet line by outlet side traversing mechanism J, The vacant tray which were backward feed the lower region in a furnace with bottom walking-beam mechanism C', and returned to the inlet line is raised by entrance-side traversing mechanism G, and glass substrates are set by the above mentioned operation.

On the other hand, the glass substrates W separated from the tray in the outlet line are transported to the glass substrate cooler style K by the taking over moving mechanism M, after being cooled here, it is extracted by the glass substrate extractor style L out of the box-like covering B, and it is inserted in a storage box etc.

[0030]

When the collimated beams 12 and 12 projected to the inlet line when explained in detail move forward to the outlet line side, said assembly tray, Are carried in to a furnace body inlet area, and on the other hand, the assembly tray which was in the inlet area is ****(ed) by the collimated beams 12 and 12, and results in the position of rise elevator mechanism U, The assembly tray ****(ed) by tray downward implement 9' of downward elevator mechanism D is also ****(ed) by the collimated beams 12 and 12, it is sent to an exit region, and the assembly tray which was in the exit region is taken out by exit a'.

The vacant tray of an exit region by moving forward so that the collimated beams 17 and 17 projected to the outlet line may project in the inlet line side synchronizing with the collimated beams 12 and 12 in a downward elevator mechanism bottom region. The vacant tray of a downward elevator mechanism bottom region moves to a rise elevator mechanism bottom region, the vacant tray of a rise elevator mechanism bottom region moves to an inlet area, and the vacant tray of an inlet area moves to the entrance a, respectively.

As mentioned above, the assembly tray which resulted in the position of rise elevator mechanism U is supported by descent of the collimated beams 12 and 12 with the tray rise implement 9, while the collimated beams 12 and 12 retreat, it is lifted, and it is supported with the tray support 7. Namely, heights and a crevice are engaged by the support 900 of the tray rise implement 9 in contact with the support 6 of undersurface 4 corner of the tray T, Subsequently, the actuator 903 for rise and fall operates, and the supporting shaft 901 goes up by this, and it is raised until the base of the support 6 of undersurface 4 corner of the tray T reaches the level of the upper tray support 7 like drawing 15. The support rod 701 rotates at this time, thereby, each tray support 7 is displaced to an actuated position from the **** position shown with the imaginary line of drawing 10, and each slot 700 engages with the support 6. Subsequently, if the tray rise implement 9 descends, the upper surface of each tray support 7 **** the flange 600. The precedence tray T is supported now by hollow shape in a furnace.

If it raises, it accumulates by operation and the top assembly tray of a state results in said almost same height level as the cross beams 11 and 11 of the tray rise-and-fall change mechanism V, The actuator 111 operates and the tray receptacle implement 110,110 results in the position of the top assembly tray tray like drawing 25 (b) and drawing 26 (a) from the position by the side of the downward elevator mechanism of drawing 25 (a)

opposite direction, an assembly tray will move to a right above [downward elevator mechanism D] position like drawing 27 (a), while it had ****(ed) with the tray receptacle implement 110,110.
In downward elevator mechanism D at this time, Since [which accumulates and raises the tray group of a state] tray downward implement 9' carries out a given stroke rise and is supported by tray support 7', The assembly tray ****(ed) with the tray receptacle implement 110,110 by the top assembly tray by the side of a downward elevator mechanism is lifted, and **** by the tray receptacle implement 110,110 is canceled. Subsequently, in order that the cross beams 11 and 11 may move to a left, the assembly tray by which the change position was carried out is ****(ed) by tray downward implement 9' of a downward elevator mechanism, When this descends, the assembly tray switched and located is supported by tray support 7' in the form loaded into the top of the tray group by the side of descent.
[0031]
An assembly tray group is raised by the rise which tray downward implement 9' described above, After tray support 7' ****, tray downward implement 9' descends and the whole assembly tray group falls, The lowest assembly tray falls from the supporting level of tray support 7', the support t of the assembly tray of a next position results in the level of drawing 12, and the assembly tray of a next position is supported as the lowest tray because tray support 7' returns to an actuated position. And it ranks second, and if the collimated beams 12 and 12 go in a lower limit position astern and go up in the following cycle, the lowest assembly tray which appears in tray downward implement 9' only one sheet will be mounted on the collimated beams 12 and 12.
[0032]
In the Johan field by the side of the tray rise in a furnace, and tray descent at this time, The heat of the heater 1 is adjusted with the circulation stirring fan 3 as a heated atmosphere, It blows in into the partition 2 of the shape of a box from the exit cone 4 with a heat-resistant filter, the glass substrates W are heated through each opening currently formed of the support 6 of each assembly tray, the stirring fan 3 absorbs from the blast area 5, and forced convection circulation heating is performed. And the assembly tray is accumulated one by one by no sliding as mentioned above. Therefore, uniform heating is improved the glass substrates W by efficiency on clean conditions.
And in the lower half region by the side of tray descent, the quantity of heat of the heater 43 is given to atmosphere in the discharge side of the circulation stirring fan 3 in the upper zone p divided with the transverse partition 41, It divides from the exit cone 4 with a heat-resistant filter as a hot wind, and blows in into the conveying space in two, and the circulation stirring fan 3 absorbs from the blast area 5. In lower zone p', in the discharge side of the circulation stirring fan 3, it is cooled by the water-cooled piping 42, and atmosphere divides from the exit cone 4 with a heat-resistant filter as cold blast, is blown into the conveying space in two, and is inhaled by the circulation stirring fan 3 from the blast area 5. Annealing of the glass substrates which serve as warm air of required temperature in order to mix and carry out convection circulation of the hot wind and cold blast which were blown as mentioned above since this conveying space was divided with the heat shield plate 410 with upper conveying space from it in the conveying space concerned, therefore pass along conveying space is carried out by a suitable temperature gradient. This warm air temperature is arbitrarily controllable by the temperature control of the heater 43.
[0033]
And if the assembly tray of an exit region is taken out by the collimated beams 12 and 12 of the upper part walking-beam mechanism C like drawing 16 in an outlet line, vertical-feed motor 321' of outlet side traversing mechanism J will drive. By it, it goes up in the parallel arms 33 and 33, it pushes up and the hole t3 for glass substrate rise and fall is penetrated in the pins 330 and 330, and a **** side supports the undersurface of an assembly tray and fits into the tooling holes t2 for a traverse in the projections 331 and 331.
If the collimated beams 12 and 12 move downward, a tray will be ****(ed) in the parallel arms 33 and 33, and glass substrates will be simultaneously lifted like the imaginary line of drawing 17 and drawing 19 by the projection of the aforementioned aggressiveness raising pins 330 and 330. It takes over in this state and the moving mechanism M carries out a cooperation operation. That is, motor 251' drives and it moves under the glass substrate position like drawing 17 in the supports 24 and 24 located in the other place till then. Subsequently, if it descends in the parallel arms 33 and 33 by vertical-feed motor 321', in order for this and one to push up and to descend in the pins 330 and 330, glass substrates descend and support and it is ****(ed) in 24 and 24. A tray and glass substrates are separated now automatically. Subsequently, it moves onto the glass substrate cooler style K, ****(ing) [supporting, when motor 251' drives to an opposite direction, and] glass substrates in 24 and 24

with movement after movement by the supports 24 and 24, or is washed. In the case of the former, descend as it is in the parallel arms 33 and 33, and when the collimated beams 17 and 17 of bottom walking-beam mechanism C' project and go up to an outlet line in the following stage, a **** substitute is carried out at this, It shifts to a return process by the protrusion stroke to the entrance side of the collimated beams 17 and 17. In the case of the latter, parallel translation is carried out to an outlet line by the drive of crossfeed motor 281' in the parallel arms 33 and 33, and a vacant tray is transported to the cleaning tank 35. At this time, the parallel arms 37 and 37 are returned to the low rank rather than the height level of the parallel arms 33 and 33 like drawing 17 in the tray rising and falling mechanism 36 near the cleaning tank. When it stops on the cleaning tank 35 in the parallel arms 33 and 33 and the motor 365 drives in this state, the parallel arms 37 and 37 go up and the gage pin 370,370 provided in the parallel arms 37 and 37 penetrates the tooling holes t1 for washing of a tray. Therefore, a tray is ****(ed) by the parallel arms 37 and 37 in the state where it was positioned stably. It returns to an outlet line by the drive of crossfeed motor 281' in the parallel arms 33 and 33 with this state, and stands by that the following assembly tray should be ****(ed), only a tray is ****(ed) from the following assembly tray by the same operation as the above, and it transports to the cleaning tank 35 of another side.

[0035]

With movement of the parallel arms 33 and 33, the parallel arms 37 and 37 sediment in the cleaning tank 35 by the drive of the motor 365, and it is washed in an operation of supersonic vibration for a short time, being immersed in rinsing liquid, and dirt and a foreign matter are removed. Fixed time lapse is carried out, and when the motor 365 drives, the parallel arms 37 and 37 can be pulled up from the cleaning tank 35. When it moves in the parallel arms 33 and 33 which finished the tray transfer to the cleaning tank of another side and stops in this state, to a former position, the parallel arms 37 and 37 descend by the drive of the motor 365, and by that cause, A washed tray is pushed up in the hole t3 for glass rise and fall, the tooling holes t3 for a traverse, and the parallel arms 33 and 33, and positioning **** is carried out by the relation between a pin and a projection. It ranks second in the parallel arms 33 and 33, and returns to an outlet line by the drive of crossfeed motor 281', and a **** substitute is carried out by operation of the collimated beams 17 and 17 of bottom walking-beam mechanism C' as mentioned above at this. Therefore, it is restored to a good air cleanliness class, and a tray can be returned to an inlet line.

[0036]

On the other hand, it is moved onto the glass substrate cooler style K in the supports 24 and 24 as mentioned above in the meantime, glass substrates are ****(ed) by the extractor style L after being cooled now directly, and after it is reversed 180 degrees here, it is taken out outside from extraction mouth b'.

That is, if glass substrates result on the cool box 39 of the glass substrate cooler style K as mentioned above, the ascending and descending means 40 operates, at least four pins 400 project on the cool box 39, thereby, glass substrates will support and it will be captivated on 24 and 24.

It supports, when it changes into this state, it moves to up to an outlet line or the extractor style L in 24 and 24, and when the ascending and descending means 40 operates subsequently to the retreat side, glass substrates descend and it is mounted on the mounting cooling surface 394 of the cool box 39. Since the refrigerant circulates in this cool box 39, the glass substrates by which annealing is carried out at said process are cooled quickly.

After predetermined time, when the ascending and descending means 40 operates again, cooled glass substrates are raised. It supports here, it moves onto the cool box 39 again in 24 and 24, and cooled glass substrates support by downward moving of the ascending and descending means 40, and it **** in 24 and 24, supports continuously, and is transported on the extractor style L by movement of 24 and 24. This state is drawing 20 thru/or drawing 22.

[0037]

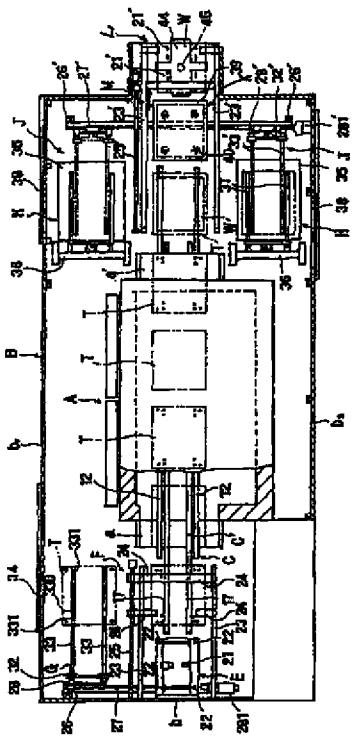
In this drawing 20 thru/or drawing 22, the case where the number of glass substrates is two is taken for the example, and each glass substrates W and W are ****(ed) in the supports 24 and 24 which face each other one sheet at a time crosswise.

If the glass substrates W and W result as mentioned above, the cradle 44 which was in the position in readiness to it will support like drawing 22 (b) by the lifting operation of the actuator 45 for reversal, it will go up to a higher rank rather than the height level of 24 and 24, and, thereby, the glass substrates W and W will be lifted by the cradle 44. It supports in this stage and evacuates in the cool box 39 direction in 24 and 24. Then, if the actuator 45 for reversal is rotated, the glass substrates W and W will rotate 180 degrees around a

Subsequently, if the actuator 45 for reversal is moved downward, the glass substrates W and W will descend mounting on the cradle 44, and the glass substrates W and W will be placed in the multi-thread band conveyors 21 and 21 like drawing 22 (c) in the process. Since the glass substrates W and W are fully cooled as mentioned above in the cool box 39, multi-thread band-conveyor 21' is not damaged with heat.
The glass substrates W and W turned by driving in the multi-thread band conveyors 21 and 21 in this state are conveyed by extraction mouth b', they can give the same directivity as the time of loading, and are inserted in storage box Q.
Namely, storage box Q has structure which only the 1 side was wide opened like drawing 23, and formed the mounting partition q in the inside in the shape of multi stage, Like drawing 24, as for the glass substrates W and W, it is dedicated to the back side of storage box Q by **, and the top glass substrates W1 are dedicated to the opening side in the direction of **, the glass substrates W2 of a next position are dedicated to the back side of storage box Q by **, and it is dedicated to the opening side in the direction of ** by the predetermined direction and this example. In this state, the glass substrates W of two sheets are taken out from the low rank side, and it is carried in from the loading slot b as mentioned above. The glass substrates W1 at this time and the direction of W2 are **** and **** from the downstream to the upstream. In this state, it mounts on a tray, and is heated, cooled slowly and cooled as mentioned above.
After carrying out storage box extraction of each glass substrates W1 and W2 when it is taken out as it is and it is dedicated to a storage box, and loaded to a processing unit by a next process, it must load, after it is reversed 180 degrees one by one, and is very complicated.
Since the inversion mechanism is provided in the extracting apparatus about this design, the glass substrates W1 and W2 will be located in a line with **** and **** from the downstream by a rise and rotation of the cradle 44 as mentioned above at the upstream, being dedicated to storage box Q from the upper row from extraction mouth b' -- the glass substrates W1 -- the back side of storage box Q -- the glass substrates W2 of a next position are stored in the direction of ** at the back side of storage box Q, and it is stored in the direction of ** at the ** and opening side at the ** and opening side. Therefore, in the following process, the glass substrates W1 and W2 can be taken out from storage box Q with the same directivity as a previous process.
[0038]
[Effect of the Device]
When based on claim 1 of this design explained above, Though it is a device with low height, maintaining a good air cleanliness class, continuous carrying of the glass substrates can be carried out, and it can be heat-treated, And after not making glass substrates take out out of the furnace of ordinary temperature with big calorific capacity but making it lower moderate within a furnace, in order to take out, the OFF by a thermal strain, while being able to shorten the continuous carrying interval of a walking-beam movement type, since disadvantage generating can be prevented and it dissociates from a tray automatically on an outlet line further, Since it is not necessary to carry out taking out to a next process promptly, to aim at improvement in the whole heat treatment efficiency, since the glass substrates separated from the tray are quenched independently, and to secure the space for radiational cooling, the effect which was excellent in the ability to miniaturize a device is acquired. After reversing the cooled glass substrates 180 degrees according to claims 5 and 6, in order to take out, The directivity of the glass substrates specified strictly can be maintained exactly, it can dedicate to a storage box in the same direction as the time of loading, and the outstanding effect that a next process can be processed smoothly well by this is acquired.

[Translation done.]

Drawing selection [Representative drawing]



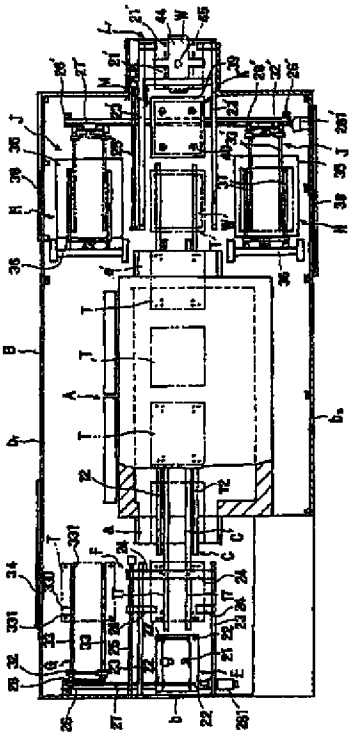
[Translation done.]

TECHNICAL FIELD

[Industrial Application]
This design is related mainly with the continuous-heat-treatment device of the glass substrates for liquid crystal display devices.
[0002]

[Translation done.]

Drawing selection [Representative drawing]



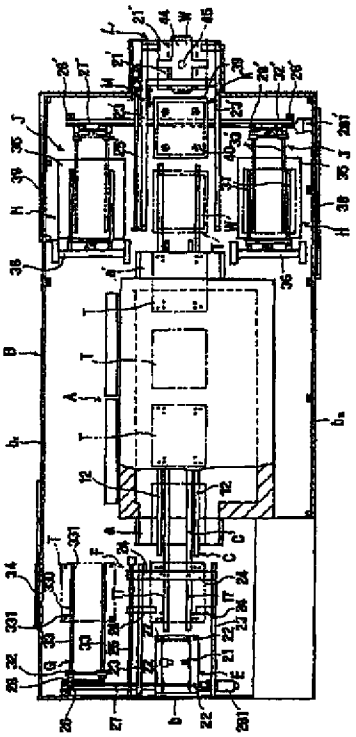
[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Device]
When based on claim 1 of this design explained above, Though it is a device with low height, maintaining a good air cleanliness class, continuous carrying of the glass substrates can be carried out, and it can be heat-treated, And after not making glass substrates take out out of the furnace of ordinary temperature with big calorific capacity but making it lower moderate within a furnace, in order to take out, the OFF by a thermal strain, while being able to shorten the continuous carrying interval of a walking-beam movement type, since disadvantage generating can be prevented and it dissociates from a tray automatically on an outlet line further, Since it is not necessary to carry out taking out to a next process promptly, to aim at improvement in the whole heat treatment efficiency, since the glass substrates separated from the tray are quenched independently, and to secure the space for radiational cooling, the effect which was excellent in the ability to miniaturize a device is acquired. After reversing the cooled glass substrates 180 degrees according to claims 5 and 6, in order to take out, The directivity of the glass substrates specified strictly can be maintained exactly, it can dedicate to a storage box in the same direction as the time of loading, and the outstanding effect that a next process can be processed smoothly well by this is acquired.

[Translation done.]

Drawing selection Representative drawing



[Translation done.]

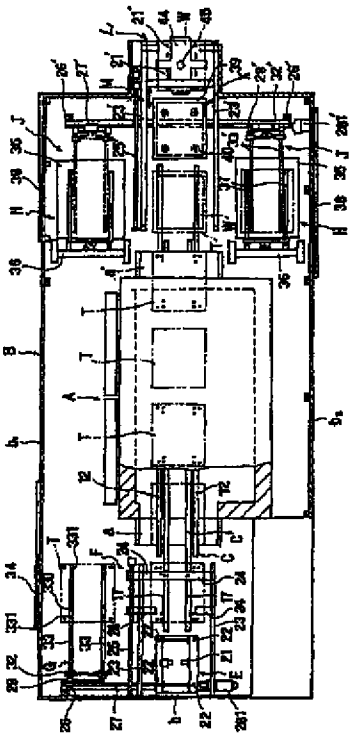
TECHNICAL PROBLEM

[Description of the Prior Art]
In the manufacturing process of a liquid crystal display device (LCD), After washing a glass substrate and drying, a minutely highly precise transparent electrode and counterelectrode are formed, The thing which formed and carried out rubbing of the molecular orientation layer to that glass substrate, which carried out afterbaking calcination, applied the sealing compound subsequently to one side of two glass substrates, applied the spacer to this substrate or the substrate of another side, and performed registration and which afterbaking calcination is carried out and is sealed is required.
Although heat treatment of such a glass substrate is carried out by making a glass substrate mount on a tray (palette) generally, and conveying the inside of a heat chamber, a very high air cleanliness class is required as the short circuit of a circuit, etc. not arising so that surface discontinuity may not be produced in that case. However, in the conventional continuation heating apparatus, a band-conveyor type, a push-rod type, etc. are adopted as a transportation means of the tray which accommodated the processed material, For this reason, the sliding part existed unescapable, it was generated by worn powder by sliding with the elements of a transportation means or a transportation means, and a tray, and there was a problem which atmosphere is disturbed by that worn powder or is soiled. Since continuation heating apparatus was horizontal and was enlarged, while the large installing space was taken, capacity became large and the clean room also had that a purge is also large-sized, then a problem to say.
This person inserts into a furnace the tray which accommodated glass substrates by parallelogram movement of a walking beam in Japanese Patent Application No. No. 177754 [four to] as this measure, A tray is accumulated on a height direction in the shape of multi stage one by one according to the elevator mechanism for a rise here, The device switches the top tray, carries out parallel translation without relative sliding with a mechanism, and makes it descend, putting in the shape of multi stage one by one according to the elevator mechanism for descent, and it was made to make move the tray of the bottom out of a furnace by the above-mentioned movement of a walking beam was proposed. Since sliding of a tray transportation system and generating of the dust resulting from it were prevented by this, it came out to often perform heat treatment and thermoforming in a clean atmosphere, and it became possible.
[0003]
However, in the above-mentioned advanced technology, there is no indication about cooling of the heated glass substrates, and glass substrates were only carried out to the unloader mouth in the state where it mounted on the tray. For this reason, it has big calorific capacity, and since the temperature of glass substrates does not fall unless it sets sufficient radiational-cooling time by an unloader mouth, it is inseparable from a tray. Since it becomes being stopping the operation of a tray circulator style until the temperature of glass substrates falls in order that a vacant tray's may move the inside of a furnace to the loader side, Since decline in the efficiency of the whole heat-treatment system was caused and a large radiational-cooling space was needed, the device became large-sized, and further, since authorized personnel needed to pick out a glass substrate from a tray by hand, there was a problem of it having been complicated and taking time and effort.
Although it is possible as this measure to cool glass substrates with cold blast etc. by an unloader mouth, the glass substrates heated by not less than 200 ** raise ****, a notch, etc. by the thermal shock and thermal strain by quenching, and the fault that an inferior-goods incidence rate increases arises.
As for glass substrates, the upper and lower sides and right and left are strictly decided from structure, a function, etc.

washing, baking of an orienting film, desiccation after rubbing, and desiccation of a sealing compound, is dedicated to a multi stage-like storage box for every process, and is taken out at the following process after this. However, since it is only taken out by the unloader mouth with a tray in the advanced technology, It was easy to produce an inconsistency in the directivity of glass substrates by authorized personnel's failure, after directivity had changed, it was dedicated to the storage box, and there was a problem that it is complicated by the time it moves to a next process, and direction correction which time requires had to be made.
[0004]
Were originated in order that this design might cancel the above problems, and the 1st purpose, It adds to the ability of heat treatment and thermoforming of glass substrates for generating of sliding and the dust resulting from it to be prevented, and to be well performed in a very clean atmosphere, Glass substrates are appropriately cooled by a small space for a short time, without making troubles, such as **** and a notch, cause, and it is in providing the continuous-heat-treatment device of the glass substrates which can attain [taking out] promotion of efficiency for facilitating and a heat treatment cycle.
In addition to the above, the 2nd purpose of this design can give and unload the directivity of regulation of glass substrates, and there is in providing the continuous-heat-treatment device of glass substrates which can work a next process well smoothly.
[0005]

[Translation done.]

Drawing selection Representative drawing

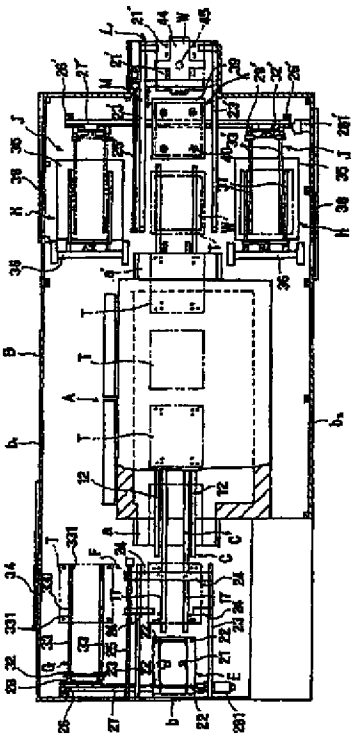


[Translation done.]

MEANS

[Means for Solving the Problem]
A rise elevator mechanism which carries out rise loading of the tray which mounted glass substrates in a furnace body to which this design has an entrance and an exit right and left in order to attain the 1st purpose of the above one by one, While arranging a downward elevator mechanism to which a tray is dropped one by one maintaining a loading state in the shape of parallel, in the upper part of a furnace body. A tray rise-and-fall change mechanism which **** a tray of the loading top which went up by a rise elevator mechanism, carries out the horizontal transfer of this and is made to **** on a tray of the loading top of a downward elevator mechanism is formed, An upper part walking-beam mechanism in which a tray which mounted glass substrates on a relation position which crosses the lower part of a furnace body with said both elevator mechanisms is conveyed from an entrance to an outlet direction, A bottom walking-beam mechanism in which a vacant tray is conveyed in the direction of an entrance from an exit is formed, To said furnace body, form an annealing mechanism of a zone atmosphere controlled circulation type in half the bottom of a downward elevator mechanism, and further in an outlet line of a furnace body. A traversing mechanism which separates glass substrates while carrying out a **** substitute from an upper part walking-beam mechanism, A glass substrate cooler style which mounts glass substrates and cools this directly, and a glass substrate taking over moving mechanism which transports the glass substrates separated by said traversing mechanism to a glass substrate cooler style are established.
In order to attain the 2nd purpose, this design forms the glass substrate extractor style L which carries out horizontal inversion of the glass substrates to a terminal of an outlet line of a furnace body, and sends it out to it.
In this design, "glass substrates" contains a flatness-like electronic circuit board etc. further a light filter besides a glass substrate etc.
[0006]

Drawing selection [Representative drawing]



[Translation done.]

EXAMPLE

[Example]
The example of this design is described based on an accompanying drawing below.
Drawing 1 thru/or drawing 3 show one example by this design, and drawing 4 thru/or drawing 23 show the details.
A is the furnace body built with thermal insulation etc., by the frame, it is supported by the desired height level and the entrance a and exit a' are provided on the same axle at lower both sides. Exit a' also leads in the furnace via the tubed exit region through the inside of a furnace via the inlet area where the entrance a makes tubed [of length as required]. The furnace body has the capacity which may be accumulated on a height direction as for the number of predetermined steps without the tray's T interfering in parallel state mutually and suiting two rows' at least.
In the furnace body A, the partition 2 of the shape of a vertical tube is formed. This partition 2 has the middle length partition 200 which divides between the tray rise side and the tray descent side, Therefore it has outside length partition 200' which reaches an inner wall of the kiln like drawing 4 in the middle length partition 200 and homotopic, ventilation space is formed between inner walls of the kiln like drawing 2 thru/or drawing 4 at the tray rise and tray descent side, respectively.
Furthermore, these ventilation space is divided by two or more horizontal partitions 201,201 like drawing 2 and drawing 3 in a sliding direction, and two or more ventilation space by the side of a tray rise and ventilation space by the side of tray descent are divided by the stage (what [is illustrated] three steps) by this, respectively.

The circulation stirring fan 3 is formed in the ventilation space of the necessary stage at the 1 side, respectively from the ventilation space of the whole page by the side of a tray rise, and the upper row by the side of tray descent.
While the blowing-in mouth 4 with a heat-resistant filter is formed in the partition 2 of the position displaced 90 degrees with the circulation stirring fan 3, The heater 1 is allocated in the field which the blast area 5 is formed in the position which stands face to face against this, and results in the blowing-in mouth 4 with a heat-resistant filter from the delivery of the circulation stirring fan 3 at least.
The atmosphere of required temperature divides with the drive of the heater 1, calorific value, and the circulation stirring fan 3 from the blowing-in mouth 4 with a heat-resistant filter by this, and it is sent into the space for conveyance in two, After circulating to the opening of each tray T of the letter of loading, from the blast area 5, the circulation stirring fan 3 absorbs and controlled circulation is carried out to it.
on the other hand -- the tray descent side -- lower -- half a step -- that is, the annealing mechanism P is formed in the ventilation space of the bottom at least. First this annealing mechanism P like drawing 3 and drawing 4 The circulation stirring fan 3 by the side of the ventilation space 1, It has this and the transverse partition 41 which reaches an inner wall of the kiln from the method of the back of the blowing-in mouth 4 with a heat-resistant filter provided in the partition 2 of the position displaced 90 degrees, the blast area 5 of a position which stands face to face against this, and the blowing-in mouth 4 with a heat-resistant filter.And in the partition 2 corresponding to the horizontal partition 201 of the ventilation space concerned, the heat shield plate 410 of the shape of an inner flange projected inside in the limit where passage of the tray T is allowed is formed, and this divides the tray descent side space and he is trying to reduce the thermal effect from the adjoining zone for heating.

piping 42 with a fin is arranged at lower zone p' at the range which results in the method of the back of the blowing-in mouth 4 with a heat-resistant filter.
The water-cooled piping 42 has reached the level below the tray support later mentioned like drawing 3.
The both ends of the water-cooled piping 42 are connected to the water cycle system 420 besides a furnace.
On the other hand, the heater 43 of a sheathed type with a fin is allocated by the range which results in the method of the back of the blowing-in mouth 4 with a heat-resistant filter like the upper zone p, and it is connected with the cooking temperature control system which the exterior does not illustrate.
B is box-like covering surrounded so that the processing chamber of a necessary size may be formed in the surroundings of the furnace body A, said -- an entrance -- a -- the same axle -- a top -- a side attachment wall -- a position -- **** -- a processed material -- ****** -- a glass substrate -- a class -- W -- a charging hole -- b -- providing -- having -- an exit -- a -- ' -- the same axle -- a top -- a side attachment wall -- **** -- heat treatment -- having finished -- a glass substrate -- a class -- W -- an extraction mouth -- b -- ' -- providing -- having -- **** . Needless to say, box-like covering is installed in a clean room and, in the processing chamber, the exhaust air and controlled atmosphere of the high grade are filled via the filter etc.
[0007]
The tray T is a jig which mounts the glass substrates W, and mechanical strengths, such as a stainless plate, are constituted by flat-surface rectangular shape with a good material. As shown in drawing 10 thru/or drawing 15, the support 6 of desired height is formed in each corner for the tray T to be stabilized, and for multi stage loading to be performed, and make it a heated atmosphere circulate uniformly in the state.
Like drawing 15, in this example, have the tray T in an edge part, and an enclosure the support 6, It has the part II object 6b which has the screw-thread axis 602 which pierces through Itabe 601 and tray board thickness which touch the part I object 6a which has the flange 600 which touches the undersurface of the tray T, and the upper surface of the tray T, and is screwed in the part I object 6a, The crevice and heights for positioning are prepared for the end face of the part I object 6a, and Itabe 601 of the part II object 6b.
In said tray T, two or more sets of holes t1, t2, and t3 are provided at the predetermined intervals like drawing 10. t1 is a hole for positioning for washing, and is allotted to the position near each strut 6 at equal intervals. t2 is the tooling holes for a traverse, and is allotted to the inside position at equal intervals in crosswise rather than said tooling holes t1 for washing. t3 is a hole for glass substrate rise and fall, and is on the same line in said tooling holes t2 for a traverse, and the cross direction, and is allotted to the inside position by at equal intervals in the length direction. This hole t3 for glass substrate rise and fall serves also as tooling holes simultaneously.
In drawing 11, the tray T has 2 sets of holes t3 for glass substrate rise and fall at a time right and left from the center. This is for mounting the two glass substrates W also simultaneously and heat-treating it.
[0008]
U is a rise elevator mechanism and is arranged to the field near an inlet area like drawing 2. D is a downward elevator mechanism and is arranged said rise elevator mechanism U and in the shape of parallel to the field near an exit region. V is a rise-and-fall change mechanism arranged at the relation which crosses said both elevator mechanisms in the upper region of a furnace body.
C -- the exit a from the entrance a -- 'the upper part walking-beam mechanism and C which have been arranged by the relation which crosses said both elevator mechanisms in between' -- the same -- exit [from the entrance a] a' -- it is a bottom walking-beam mechanism arranged by the relation which crosses said both elevator mechanisms in between.
The glass substrate charging machine style by which E has been arranged in the charging hole b, the glass substrate taking over moving mechanism which F receives the glass substrates W from said glass substrate charging machine style E, and is transported to the upper part of an inlet line, i.e., an upper part walking-beam mechanism, G is an entrance-side traversing mechanism which receives the tray T from bottom walking-beam mechanism C', and is made to transport to the upper part walking-beam mechanism C. Although the entrance-side traversing mechanism serves as a means to move a tray in the direction parallel to an inlet line again, in this example, it is not limited to this.
Although H is a tray soaping-machine style arranged if needed in the processing chamber of the side of exit a' and it is arranged like drawing 1 in this example at every one both sides of an outlet line, only one side is.
J is an outlet side traversing mechanism for receiving the tray T from the upper part walking-beam mechanism C in an outlet line, and making it **** to bottom walking-beam mechanism C'. Although outlet side traversing

The glass substrate extractor style by which L has been arranged at extraction mouth b', the glass substrate cooler style by which K was provided on the outlet line of the upstream from the glass substrate extractor style L, M is a glass substrate taking over moving mechanism for receiving glass substrates from outlet side traversing mechanism J, and transporting to the glass substrate cooler style K and the glass substrate extractor style L one by one.

[0009]

In the upper level, rise elevator mechanism U has a little two or more tray support 7 which can rotate freely around a perpendicular axis from the ascending position of the upper part walking-beam mechanism C shown in drawing 2. In what is illustrated, the number of these tray support 7 is four.

Like drawing 10, drawing 14, and drawing 15, for example, width differs from a linear dimension, it is constituted as the plate of rectangular form thru/or a block, respectively, When a long piece turns to an inner direction, it supports, the corner bottom 600, i.e., the support flange, of the tray T, and a long piece rotates 90 degrees, for example, a support of the tray T can be canceled.

The slot 700 which engages and releases the part I object 6a of the support 6 from width is formed near the free end of the tray support 7. Said tray support 7 is attached to the upper bed of two or more support rods (a drawing 4) 701 which pierce through a hearth and are extended from the lower part of the furnace body A like drawing 2 and drawing 3.

Each support rod 701 has middle held to the rib 702 constructed across horizontally under the hearth c, A lower end is supported movably by the bearing provided in the base frame, the rotating element 703, for example, BEBERUGIYA, is attached near the bearing, and he is trying to drive all at once by the rotary actuator which does not illustrate BEBERUGIYA 704 of a driving side.

Every support rod may be sufficient as a rotary actuator, and it may operate every 2 or the whole by Kazumoto.

[0010]

Rise elevator mechanism U is further located in a lower level rather than a **** side at the time of the rise of the collimated beams 12 and 12 which the upper part walking-beam mechanism C mentions later in a low rank, i.e., a normal state, rather than said tray support 7, The tray rise implement 9 which receives the tray T at the time of descent of the collimated beams 12 and 12, and is raised toward said tray support 7 is allotted.

Said tray rise implement 9 consists of couples at least, is seen from the side side, and is allotted inside said support rod 701 (in the transverse-plane side, it is on the same vertical plane mostly with the support rod 701 like drawing 3). Each tray rise implement 9 makes plate shape thru/or the shape of a nail, it has the support 900 of the shape of a boss over the support 6 of the tray T in a tip part, and, as for the support 900, the heights of the support end face have a **** crevice.

The tray rise implement 9 is being fixed to the upper bed of two or more sets (a drawing 2 sets) of supporting shafts 901.

The supporting shaft 901 has the tray rise implement 9 in a low rank rather than the upper limit position of the upper part walking beam C in a normal state, it pierces through the hearth c, is extended in a furnace, and is connected with drive mechanism so that even the neighborhood level of the tray support 7 can go up and down like drawing 15 from this level.

In this example, to the supporting shaft 901, it pierces through the rib 702, is extended, and is combined by the connecting plate 902, and that connecting plate 902 is operated by the actuator 903 for rise and fall. Although the oil hydraulic cylinder of the actuator 903 for rise and fall, etc. are arbitrary, in this example, a motor is used, the ball screw axis 904 connected with that output side is held by a bearing at the rib 702, and the female screw member 905 fixed to the ball screw axis 904 at the connecting plate 902 is screwing.

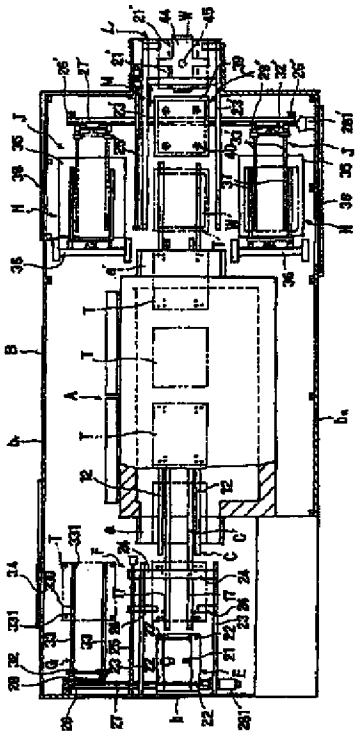
Upwards, fixed tray support 8' is provided via the middle frame 10 from the height direction middle of an inlet area and an outlet area like drawing 9. It is for this fixed tray support 8' supporting the tray which consisted of two or more pins or a parallel plate, and was inserted in from the entrance a by the upper part walking-beam mechanism C, and the tray T before being carried to exit a' from the inside of a furnace at the time of descent of the upper part walking-beam mechanism C.

In an inlet area, an outlet area, and each hearth part of a rise elevator mechanism lower part and a downward elevator mechanism lower part, the fixed tray support [lower than the rise level of the collimated beams 17 and 17 of bottom walking-beam mechanism C'] 8 higher than a downward level is arranged.

In the case of parallelogram movement of bottom walking-beam mechanism C', a tray is ****(ed) in each

[0011]
The composition of downward elevator mechanism D is the same as said rise elevator mechanism U, Tray support 7' which rotates 90 degrees or more around a perpendicular axis, and can cancel a support of the tray T while being arranged slightly in [upper limit level / of the upper part walking-beam mechanism C / in a higher rank] interval and supporting the tray T in the shape of loading, It has tray downward implement 9' raised toward tray support 7', being in a low rank and supporting the tray T rather than this tray support 7'. These tray support 7' and tray downward implement 9' give numerals with a comma to the same portion structurally similarly to rise elevator mechanism U therefore, and explanation is omitted.
Although the tray rise implement 9 and tray downward implement 9' are used in this example as a tray support by the position of rise elevator mechanism U and downward elevator mechanism D, of course depending on the case, a fixed tray support may be established via the middle frame 10. In this case, the tray rise implement 9 and tray downward implement 9' stand by on a lower level more moderately than a fixed tray support.
[0012]
Next, the tray rise-and-fall change mechanism V is a means for receiving the top tray loaded by said rise elevator mechanism U, and carrying out the crossfeed of this to the top tray currently loaded into downward elevator mechanism D.
It collaborates with rise elevator mechanism U and downward elevator mechanism D, walking-beam movement is performed, and a tray is ****(ed), without being accompanied by sliding.

Drawing selection Representative drawing



[Translation done.]

(19)日本国特許庁（ＪＰ）　(12) 公開実用新案公報（U）　(11)実用新案出願公開番号

実開平7－15742

(43)公開日　平成７年(1995) ３月17日

(51)Int.Cl.[6]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｃ０３Ｂ　32/00				
Ｂ６５Ｇ　49/06				
Ｇ０２Ｆ　1/13	１０１			
// Ｂ２９Ｃ　35/02		9156－4Ｆ		

審査請求　未請求　請求項の数７　ＦＤ　（全 ８ 頁）

(21)出願番号　実願平5－47984

(22)出願日　平成５年(1993) ８月12日

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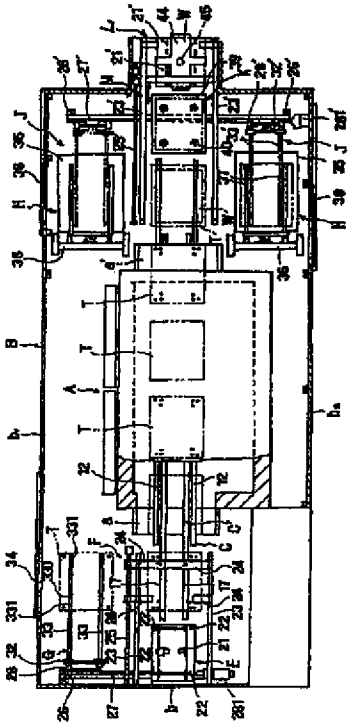
(54)【考案の名称】　ガラス基板類の連続熱処理装置

(57)【要約】　（修正有）
【構成】左右に入口ａと出口ａ’を有する炉体内に、ガラス基板類Ｗを受載したトレイＴを順次上昇積載させる上昇エレベータ機構Ｕと、トレイを下降させるエレベータ機構Ｄを配置する一方、炉体の上部には、上昇エレベータ機構Ｕで上昇された積載最上位のトレイを受支しこれを横移送して下降エレベータ機構Ｄの積載最上位のトレイの上に受支させるトレイ昇降切換え機構Ｖを設け、炉体Ａの下部には、両エレベータ機構とクロスする関係位置に、ガラス基板類を受載したトレイを入口から出口方向に搬送する上側ウオーキングビーム機構Ｃと、空トレイを出口から入口方向に搬送する下側ウォーキングビーム機構Ｃ’を設け、出口ラインには、上側ウオーキングビーム機構Ｃからトレイを受支換えするとともにガラス基板類を分離するトラバース機構Ｊより成るガラス基板類の連続熱処理装置。
【効果】クリーンな雰囲気下で、効率的に熱処理が行なえる。



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【実用新案登録請求の範囲】

【請求項１】左右に入口ａと出口ａ’を有する炉体内に、ガラス基板類Ｗを受載したトレイＴを順次上昇積載させる上昇エレベータ機構Ｕと、トレイを積載状態を保ちつつ順次下降させる下降エレベータ機構Ｄを並列状に配置する一方、炉体の上部には、上昇エレベータ機構Ｕで上昇された積載最上位のトレイを受支しこれを横移送して下降エレベータ機構Ｄの積載最上位のトレイの上に受支させるトレイ昇降切換え機構Ｖを設け、炉体Ａの下部には、前記両エレベータ機構とクロスする関係位置に、ガラス基板類を受載したトレイを入口から出口方向に搬送する上側ウオーキングビーム機構Ｃと、空トレイを出口から入口方向に搬送する下側ウォーキングビーム機構Ｃ’を設け、前記炉体には下降エレベータ機構Ｄの下半ゾーンに雰囲気強制循環式の徐冷機構Ｐを設け、さらに炉体の出口ラインには、上側ウオーキングビーム機構Ｃからトレイを受支換えするとともにガラス基板類を分離するトラバース機構Ｊと、ガラス基板類を受載してこれを直接冷却するガラス基板類冷却機構Ｋと、前記トラバース機構Ｊで分離されたガラス基板類をガラス基板類冷却機構Ｋへ移送するガラス基板類引取り移動機構Ｌを設けたことを特徴とするガラス基板類の連続熱処理装置。

【請求項２】徐冷機構Ｐが、トレイの自由な下降を許す断面積を有し一側に耐熱フィルタ付きの吹込み口４を他側に排風口５を有する縦筒状の仕切り２と、前記仕切り２と炉体内壁間の空間に配された循環撹拌用ファン３と、循環撹拌用ファン３の吐出側の空間に配された水冷配管４２とを備えている請求項１に記載のガラス基板類の連続熱処理装置。

【請求項３】水冷配管４２よりも上方の空間が横仕切り板４１で区画され、その横仕切り板４１より上の空間に徐冷雰囲気温度調節用のヒータ４３が配されているものを含む請求項２に記載のガラス基板類の連続熱処理装置。

【請求項４】ガラス基板類冷却機構Ｋが、ガラス受載面３９４を有し内部に冷媒を満たしたクールボックス３９と、ガラス受載面３９４を貫いて突出可能な作動ロッドを有するガラス基板類昇降手段４０を備えている請求項１ないし３のいずれかに記載のガラス基板類の連続熱処理装置。

【請求項５】炉体の出口ラインの端末にガラス基板類を水平反転して送り出すガラス基板類抽出機構Ｌを設けているものを含む請求項１ないし４のいずれかに記載のガラス基板類の連続熱処理装置。

【請求項６】ガラス基板類抽出機構Ｌが、多条ベルトコンベア２１’と、多条ベルトコンベア２１’間に配されたガラス基板類の受台４４と、該受台４４を常態において多条ベルトコンベア２１’の張り側より下位に位置させ、要時に受台４４を多条ベルトコンベア２１’の張り側より上位に上昇させるとともに回転させる反転用アクチュエータ４５を備えている請求項５に記載のガラス基板類の連続熱処理装置。

【請求項７】炉体の出口ライン側方にトレイ洗浄機構Ｈを有し、トラバース機構Ｊがトレイをトレイ洗浄機構Ｈに移送すべく出口ラインに対し平行移動自在となっているものを含む請求項１ないし６のいずれかに記載のガラス基板類の連続熱処理装置。

【図面の簡単な説明】

【図１】本考案によるガラス基板類の連続熱処理装置の一実施例を示す平面図である。

【図２】図１の縦断側面図である。

【図３】図１の下降レベータ機構側の縦断正面図である。

【図４】図１の炉体下部域の部分的横断面図である。

【図５】図１における入口領域の拡大平面図である。

【図６】図５のＶ－Ｖ線に沿う断面図である。

【図７】図５のＶＩ－ＶＩ線に沿う断面図である。

【図８】図５のＶＩＩ－ＶＩＩ線に沿う部分切欠断面図である。

【図９】炉体入口域と出口域の部分的拡大正面図である。

【図１０】トレイとエレベータ機構およびウォーキングビーム機構の関係を示す平面図である。

【図１１】本考案で使用するトレイの別の実施例を示す平面図である。

【図１２】図１１のトレイに使用する平行アームの側面図である。

【図１３】トレイの積み上げ状態を示す正面図である。

【図１４】トレイ支持具とトレイ上昇具(トレイ下降具)の関係を示す部分拡大平面図である。

【図１５】トレイ支持具とトレイ上昇具(トレイ下降具)によるトレイの受支状態を示す部分的拡大正面図である。

【図１６】図１における出口領域の拡大平面図である。

【図１７】図１６のＸＶＩＩ－ＸＶＩＩ線に沿う断面図である。

【図１８】トレイ洗浄機構とトラバース機構の取り合いを示す縦断側面図である。

【図１９】トラバース機構とガラス基板類冷却機構と引取り移動機構の関係を示す部分切欠側面図である。

【図２０】ガラス基板類抽出機構の詳細を示す平面図である。

【図２１】同じくその縦断正面図である。

【図２２】ガラス基板類抽出機構の作動を段階的に示す側面図である。

【図２３】トレイ収納ボックスの斜視図である。

【図２４】ガラス基板類抽出機構を使用したときのガラス基板類の移動方向を示す説明図である。

【図２５】本考案におけるトレイ昇降切換え機構の作動

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を段階的に示す側面図である。

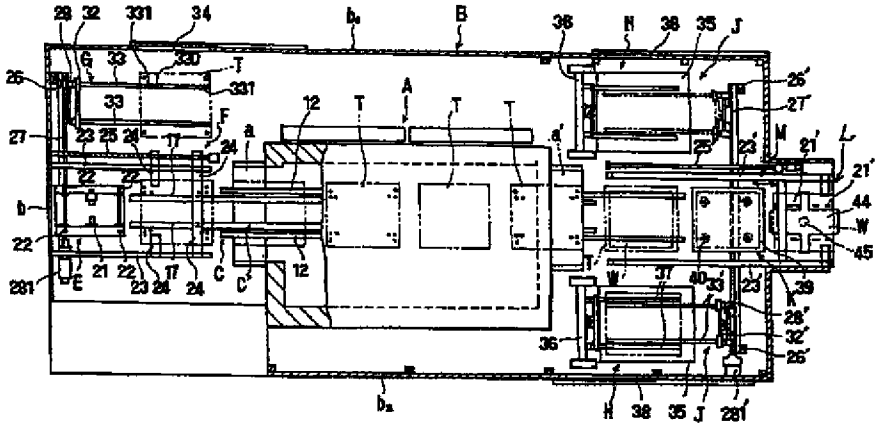
【図２６】本考案におけるトレイ昇降切換え機構の作動を段階的に示す正面図である。

【図２７】本考案におけるトレイ昇降切換え機構の作動を段階的に示す側面図である。

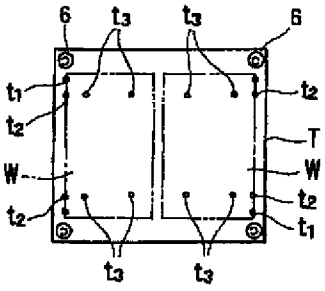
【符号の説明】

A　炉体
B　ボックス状カバー
C　上側ウォーキングビーム機構
C'　下側ウォーキングビーム機構
D　下降エレベータ機構
E　ガラス基板類装入機構
F　ガラス基板類引取り移動機構
G　入口側トラバース機構
H　トレイ洗浄機構
J　出口側トラバース機構
L　ガラス基板類抽出機構
M　ガラス基板類引取り移動機構
P　徐冷機構
＊T　トレイ
U　上昇エレベータ機構
V　昇降切換え機構
W　ガラス基板類
a　入口
a'　出口
2　仕切刹
3　循環撹拌ファン
4　吹込み口
5　排風口
21，21'　多条ベルトコンベア
39　クールボックス
40　昇降手段
41　横仕切り板
42　水冷配管
43　ヒータ
44　受台
45　反転用アクチュエータ
＊　394　受載面

【図１】



【図１１】



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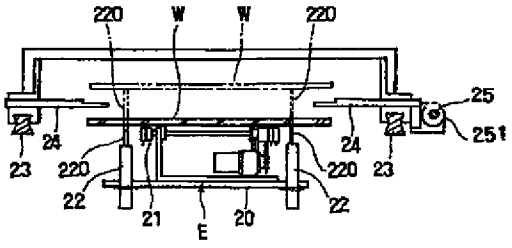

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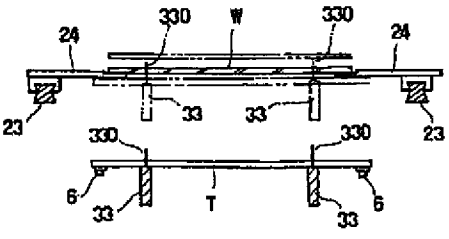
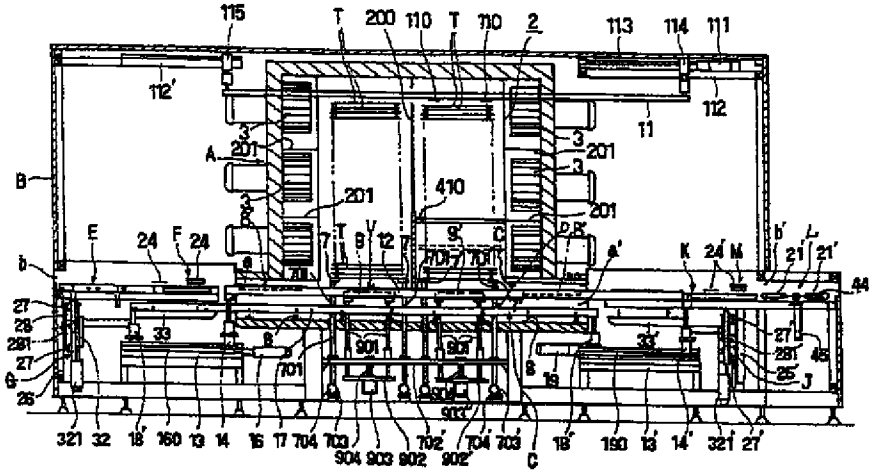
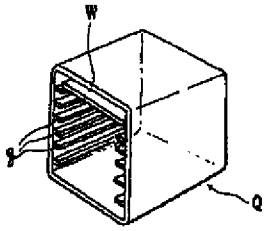


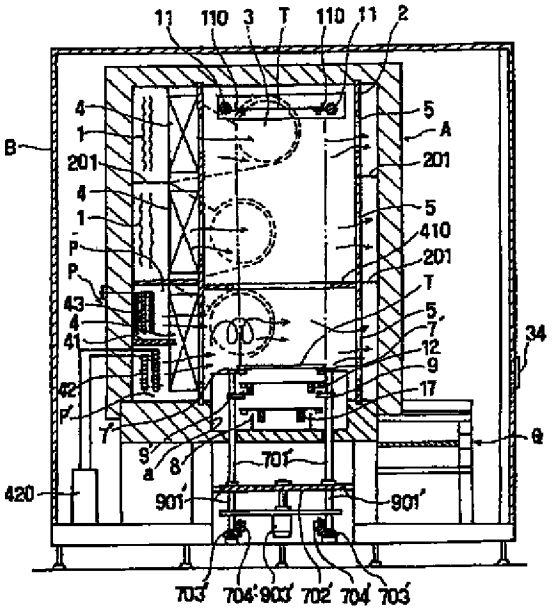
【図２】



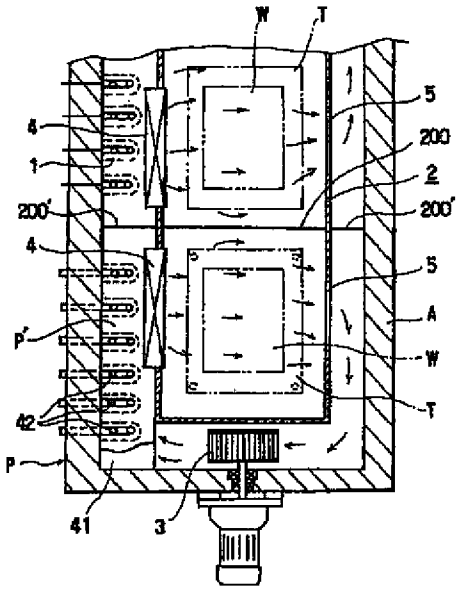
【図２３】



【図３】



【図４】



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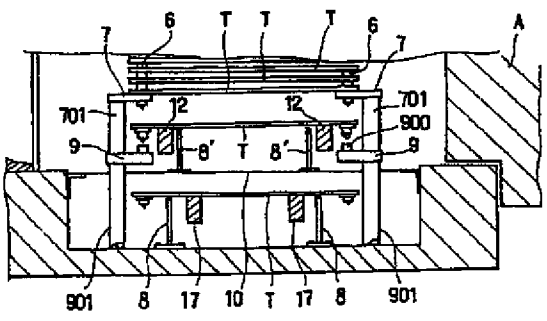
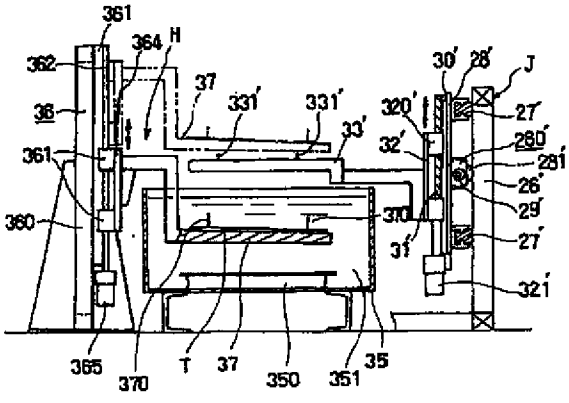


【図１８】



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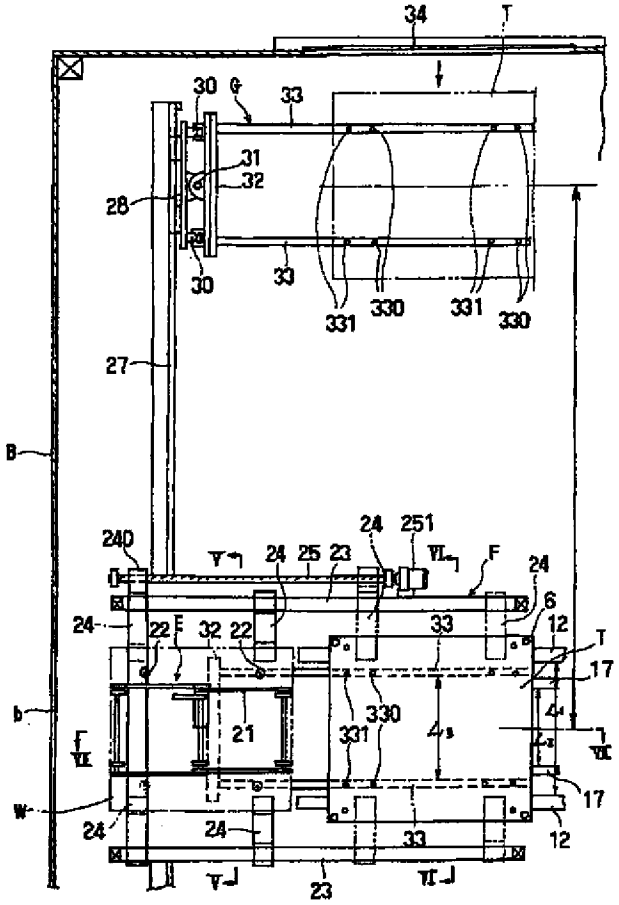

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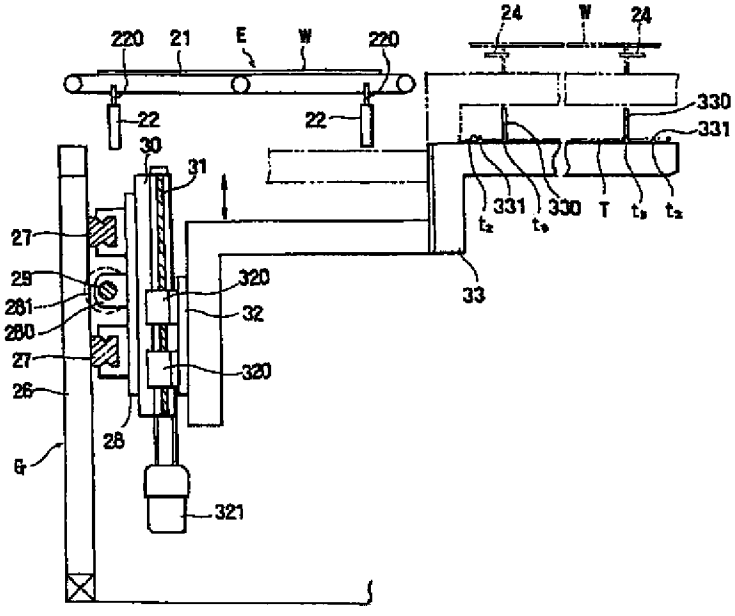
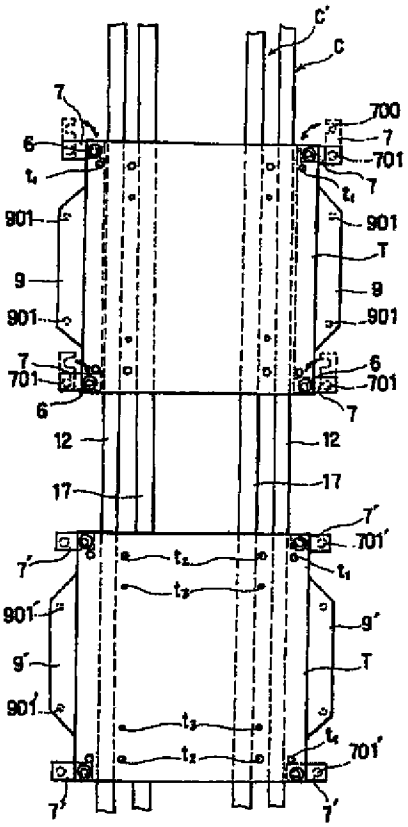
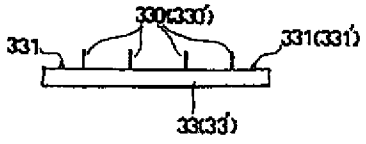


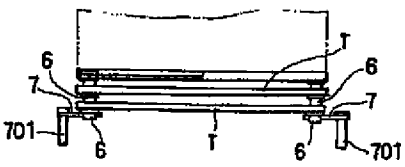
【図10】



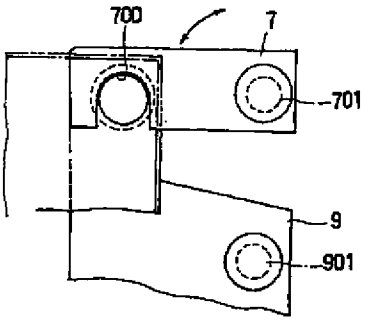
【図12】



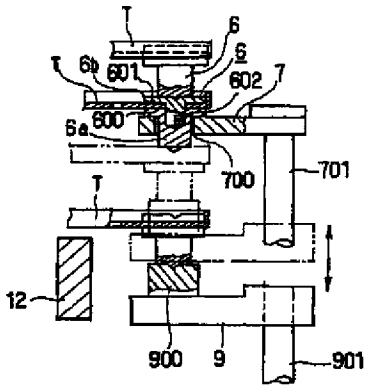
【図13】



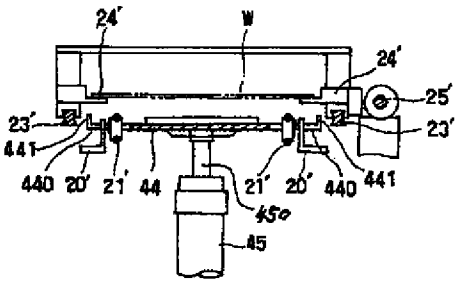
【図１４】



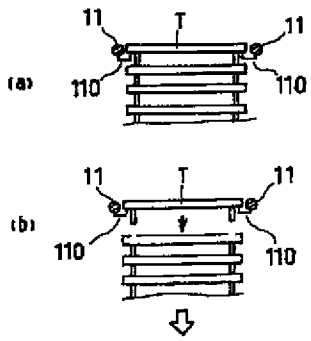
【図１５】



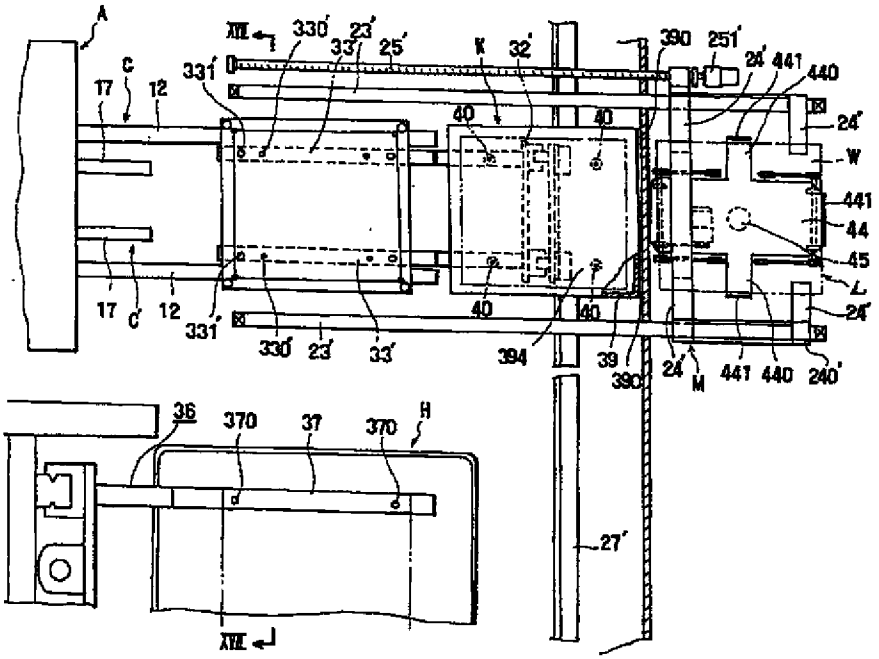
【図２１】



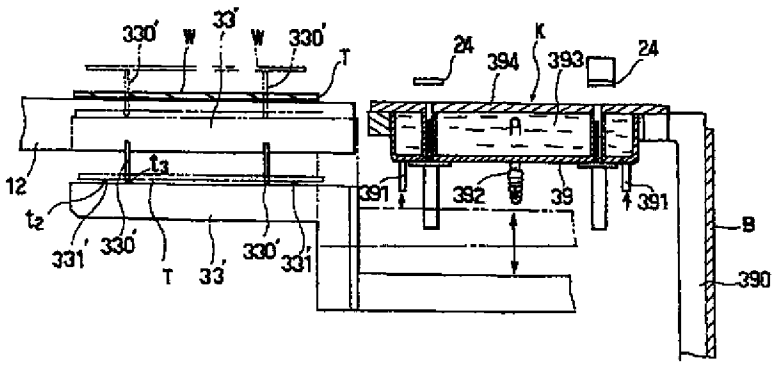
【図２６】



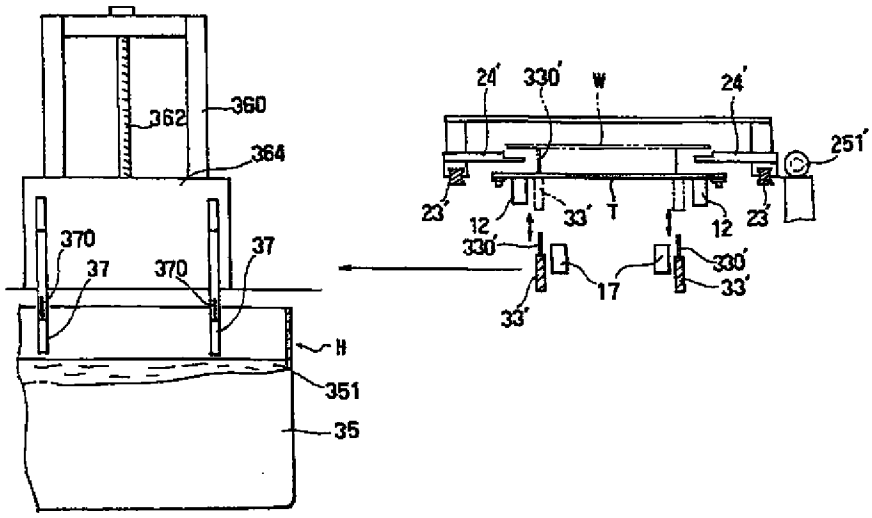
【図１６】



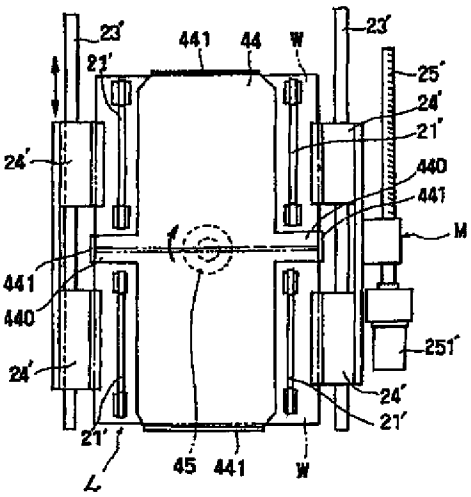
【図１９】



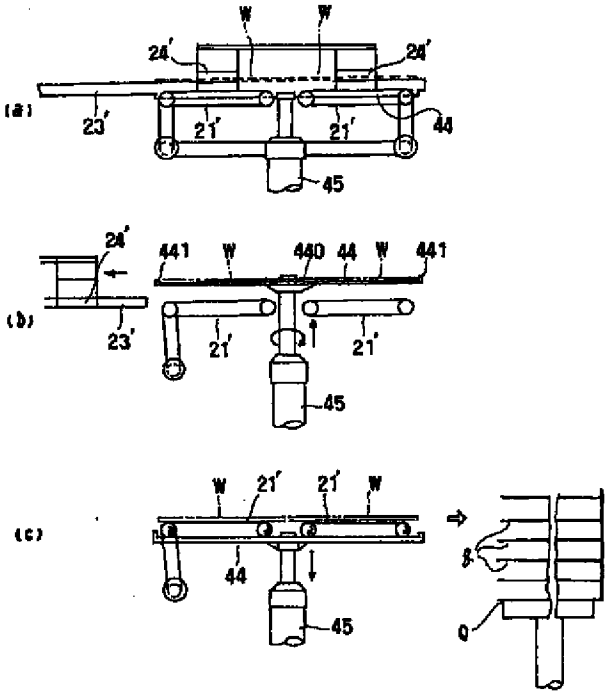
【図１７】



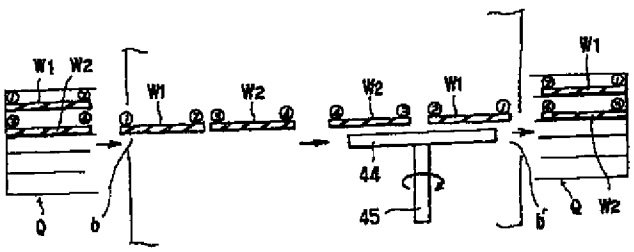
【図２０】



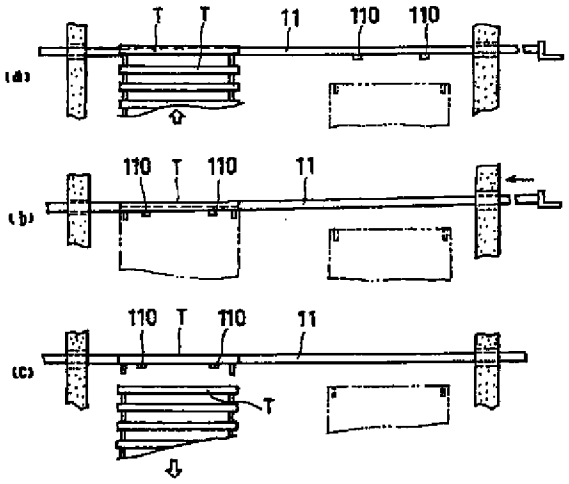
【図２２】



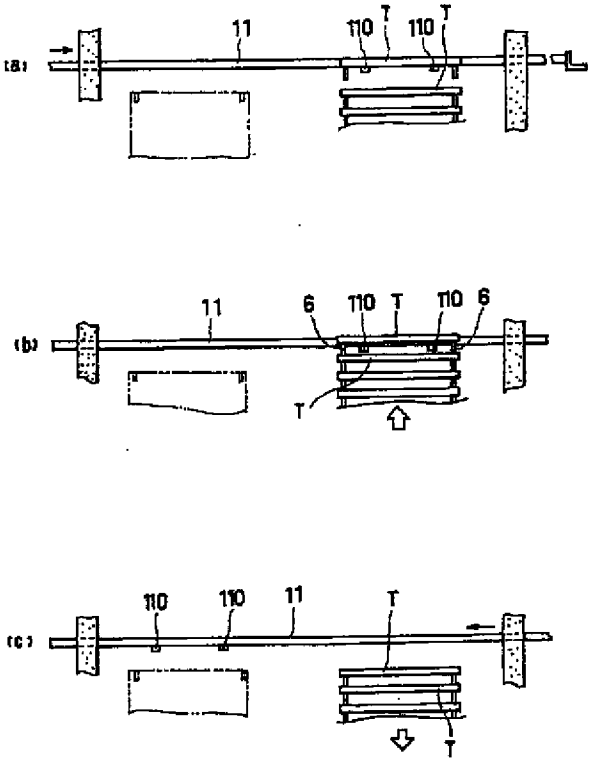
【図２４】



【図25】


(a)
T
T
11
110
110
(b)
110
T
110
11
(c)
110
T
110
11
T

【図27】


(a)
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【考案の詳細な説明】

【０００１】

【産業上の利用分野】

本考案は主として液晶ディスプレイデバイス用ガラス基板類の連続熱処理装置に関する。

【０００２】

【従来の技術及びその技術的課題】

液晶ディスプレイデバイス（ＬＣＤ）の製造工程においては、ガラス基板を洗浄し乾燥したのち、微細高精度な透明電極や対向電極を形成し、そのガラス基板に分子配向層を形成してラビングした後加熱焼成し、次いで２枚のガラス基板の一方にシール剤を塗布し、この基板または他方の基板にスペーサを塗布し、位置合せを行った後加熱焼成して封着することが必要である。

このようなガラス基板の熱処理は、一般にトレイ（パレット）にガラス基板を受載させて加熱室内を搬送することにより実施されるが、その際に表面欠陥を生じさせないように、また回路のショート等が生じないようにきわめて高いクリーン度が要求される。

しかし従来の連続加熱装置においては、被処理物を収容したトレイの搬送手段としてベルトコンベア式やプッシュロッド式などが採用されており、このため摺動部が不可避的に存在し、搬送手段の要素同士、あるいは搬送手段とトレイとの摺動によって摩耗粉が発生し、その摩耗粉によって雰囲気が乱されたり汚損される問題があった。また、連続加熱装置が水平方向で大型化するため設置スペースが大きくとられるとともにクリーンルームも容積が大きくなり、浄化装置も大型するという問題があった。

この対策として本考案者は、特願平４－１７７７５４号において、ガラス基板類を収容したトレイをウオーキングビームの平行四辺形運動で炉内に挿入し、ここで上昇用エレベータ機構によりトレイを順次高さ方向に多段状に積み上げ、最上位のトレイを切換え機構により相対摺動なしに平行移動させ、下降用エレベータ機構により順次多段状に積み重ねながら下降させ、最下段のトレイをウオーキングビームの上記運動により炉外に移動させるようにした装置を提案した。これ

により、トレイ搬送系の摺動とそれに起因する塵埃の発生が防止されるためクリーンな雰囲気にて能率よく熱処理や熱加工を行うことがで可能となった。

【０００３】

しかしながら、上記先行技術では、加熱されたガラス基板類の冷却について開示がなく、ガラス基板類はトレイに受載された状態でアンローダロに持ち出されるだけであった。このため大きな熱容量を有しており、アンローダロで十分な放冷時間をおかないとガラス基板類の温度が下がらないため、トレイから分離することはできない。空トレイは炉内をローダ側に移動するため、ガラス基板類の温度が低下するまでの間はトレイ循環機構の作動は休止することになるになるため、加熱処理系全体の能率の低下を招き、また広い放冷スペースを必要とするため装置が大型となり、さらに、作業員が手でトレイからガラス基板を取出す必要があるため、煩雑で手間がかかるという問題があった。

この対策としては、アンローダロでガラス基板類を冷風等により冷却することが考えられるが、２００℃以上に加熱されたガラス基板類が急冷による熱衝撃や熱歪により切損や切欠きなどを起こし、不良品発生率が増すという不具合が生ずる。

またガラス基板類は、構造や機能などから、上下、左右が厳密に決められており、全工程が終わるまで方向性が変化してはならない。一方、ガラス基板類の加熱は洗浄後の乾燥、配向膜の焼き付け、ラビング後の乾燥、シール剤の乾燥など各工程ごとに実施され、各工程ごとに多段状の収納ボックスに納められ、次の工程でこれから取り出される。しかし先行技術では単にアンローダロにトレイとともに搬出されるだけであるため、作業員の操作ミスによりガラス基板類の方向性に食い違いが生じやすく、方向性が変わった状態で収納ボックスに納められ、次工程に移るまでに煩雑で時間のかかる方向修正を行わなければならないという問題があった。

【０００４】

本考案は前記のような問題点を解消するために創案されたもので、その第１の目的は、摺動とそれに起因する塵埃の発生を防止しきわめてクリーンな雰囲気にて能率よくガラス基板類の熱処理や熱加工を行うことができることに加え、切損

や切欠きなどのトラブルを起こさせずにガラス基板類を短時間で小スペースで適切に冷却し、搬出を容易化と熱処理サイクルを能率化を達成できるガラス基板類の連続熱処理装置を提供することにある。

また、本考案の第２の目的は、上記に加えて、ガラス基板類を規定の方向性を持たせてアンロードすることができ、次工程の作業をスムーズに能率よく行うことができるガラス基板類の連続熱処理装置を提供することにある。

【０００５】

【課題を解決するための手段】

上記第１の目的を達成するため本考案は、左右に入口と出口を有する炉体内に、ガラス基板類を受載したトレイを順次上昇積載させる上昇エレベータ機構と、トレイを積載状態を保ちつつ順次下降させる下降エレベータ機構を並列状に配置する一方、炉体の上部には、上昇エレベータ機構で上昇された積載最上位のトレイを受支しこれを横移送して下降エレベータ機構の積載最上位のトレイの上に受支させるトレイ昇降切換え機構を設け、炉体の下部には、前記両エレベータ機構とクロスする関係位置に、ガラス基板類を受載したトレイを入口から出口方向に搬送する上側ウオーキングビーム機構と、空トレイを出口から入口方向に搬送する下側ウォーキングビーム機構を設け、前記炉体には下降エレベータ機構の下半にゾーン雰囲気強制循環式の徐冷機構を設け、さらに炉体の出口ラインには、上側ウオーキングビーム機構から受支換えするとともにガラス基板類を分離するトラバース機構と、ガラス基板類を受載してこれを直接冷却するガラス基板類冷却機構と、前記トラバース機構で分離されたガラス基板類をガラス基板類冷却機構へ移送するガラス基板類引取り移動機構を設けたものである。

また、第２の目的を達成するため本考案は、炉体の出口ラインの端末にガラス基板類を水平反転して送り出すガラス基板類抽出機構Ｌを設けたものである。

本考案において「ガラス基板類」は、ガラス基板のほかカラーフィルタなどさらには平坦状の電子回路基板などを含むものである。

【０００６】

【実施例】

以下本考案の実施例を添付図面に基いて説明する。

図１ないし図３は本考案による一実施例を示しており、図４ないし図２３はその詳細を示している。

Ａは断熱材などで構築された炉体であり、フレームによって所要高さレベルに支持され、下部両側には入口ａと出口ａ’とが同軸上に設けられている。入口ａは所要長さの筒状をなす入口域を介して炉内に通じ、出口ａ’も筒状の出口域を介して炉内に通じている。炉体はトレイＴが少なくとも平行状に２列互いに干渉しあわないでかつ高さ方向に所定段数積み上げられ得る容積を有している。

炉体Ａ内には縦筒状の仕切り２が設けられている。この仕切り２はトレイ上昇側とトレイ下降側間を区画する中間縦仕切り２００を有しており、中間縦仕切り２００と同位置には図４のように炉内壁に達する外縦仕切り２００’を有しているしたがって、トレイ上昇側とトレイ下降側には、図２ないし図４のように、炉内壁とのあいだにそれぞれ通風空間が画成されており、さらにそれら通風空間は、図２と図３のように複数の横仕切り２０１，２０１によって上下方向で区画され、これによってトレイ上昇側の通風空間とトレイ下降側の通風空間はそれぞれ複数段(図示するものでは3段)に区画されている。

トレイ上昇側の全段の通風空間とトレイ下降側の上段から所要段の通風空間には、それぞれ一側に循環撹拌ファン３が設けられており、循環撹拌ファン３とたとえば９０度変位した位置の仕切り２には耐熱フィルタ付きの吹込み口４が設けられるとともに、これと対峙する位置に排風口５が設けられており、かつ少なくとも循環撹拌ファン３の吐出口から耐熱フィルタ付吹込み口４に到る領域にヒータ１が配設されている。これによりヒータ１と発熱量と循環撹拌ファン３の駆動で所要温度の雰囲気が耐熱フィルタ付吹込み口４から仕切り２内の搬送用空間に送り込まれ、積載状の各トレイＴの空隙に流通した後、排風口５から循環撹拌ファン３に吸い込まれて強制循環させられるようになっている。

一方、トレイ下降側の下半段すなわち少なくとも最下段の通風空間には徐冷機構Ｐが設けられている。この徐冷機構Ｐはまず図３と図４のように、通風空間一側の循環撹拌ファン３と、これとたとえば９０度変位した位置の仕切り２に設けられた耐熱フィルタ付きの吹込み口４と、これと対峙する位置の排風口５と、耐熱フィルタ付きの吹込み口４の背方から炉内壁に達する横仕切板４１を有してい

る。そして、当該通風空間の横仕切り２０１に対応する仕切り２内にはトレイＴの通過を許す限度で内側に張出す内フランジ状の遮熱板４１０が設けられ、これによりトレイ下降側空間を区切り、隣接する加熱用ゾーンからの熱影響を低減させるようにしている。

前記横仕切板４１は断熱機能を有し、当該通風空間の全部でなく所要範囲たとえば循環撹拌ファン３の吐出側から外縦仕切り２００’までの範囲を上ゾーンｐと下ゾーンｐ’に区画している。そして、下ゾーンｐ’には、耐熱フィルタ付きの吹込み口４の背方にいたる範囲にフィン付きの水冷配管４２が配置されており、水冷配管４２は図３のように後述するトレイ支持具よりも下のレベルに達している。水冷配管４２の両端は炉外の水循環系４２０に接続されている。これに対し、上ゾーンｐには同様に耐熱フィルタ付きの吹込み口４の背方にいたる範囲にフィン付きシーズ型のヒータ４３が配設され、外部の図示しない加熱温度制御系と接続されている。

Ｂは炉体Ａの周りに所要の大きさの処理室を形成するように囲繞するボックス状カバーであり、前記入口ａと同軸上の側壁位置には被処理物としてのガラス基板類Ｗの装入口ｂが設けられ、出口ａ’と同軸上の側壁には熱処理を終えたガラス基板類Ｗの抽出口ｂ’が設けられている。いうまでもなくボックス状カバーはクリーンルームに設置され、処理室はフィルタなどを介して高純度のエアや雰囲気ガスが満たされている。

【０００７】

トレイＴはガラス基板類Ｗを受載する治具であり、ステンレス板など機械的強度が良好な材料により平面矩形状に構成されている。トレイＴは安定して多段積載を行えかつその状態で加熱雰囲気がまんべんなく流通するようにすべく、図１０ないし図１５に示すように、各隅部に所要高さの支柱６が設けられている。

この実施例では、図１５のようにトレイＴは周縁部に囲壁を有し、支柱６は、トレイＴの下面に接するフランジ６００を有する第１部体６ａと、トレイＴの上面に接する板部６０１とトレイ板厚を貫いて第１部体６ａに螺合するねじ軸６０２を有する第２部体６ｂとを有しており、第１部体６ａの端面と第２部体６ｂの板部６０１には位置決め用の凹部と凸部が設けられている。

前記トレイＴは、図１０のように所定の間隔で複数組の孔ｔ１，ｔ２，ｔ３が設けられている。ｔ１は洗浄用位置決め用孔で、各支柱６に近い位置に等間隔で配されている。ｔ２はトラバース用位置決め孔であり、前記洗浄用位置決め孔ｔ１よりも幅方向で内側位置に等間隔で配されている。ｔ３はガラス基板類昇降用孔であり、前記トラバース用位置決め孔ｔ２と幅方向で同一線上でかつ長さ方向では内側位置に等間隔で配されている。このガラス基板類昇降用孔ｔ３は同時に位置決め孔も兼ねている。

図１１においては、トレイＴはガラス基板類昇降用孔ｔ３を中心から左右に２組ずつ有している。これはガラス基板類Ｗを２枚同時にも受載して熱処理できるようにするためである。

【０００８】

Ｕは上昇エレベータ機構であり、図２のように入口域に近い領域に配置されている。Ｄは下降エレベータ機構であり、出口域に近い領域に前記上昇エレベータ機構Ｕと並列状に配置されている。Ｖは炉体の上部領域において前記両エレベータ機構とクロスする関係に配置された昇降切換え機構である。

Ｃは入口ａから出口ａ’間に前記両エレベータ機構とクロスする関係で配置された上側ウォーキングビーム機構、Ｃ’は同様に入口ａから出口ａ’間に前記両エレベータ機構とクロスする関係で配置された下側ウォーキングビーム機構である。

Ｅは装入口ｂに配置されたガラス基板類装入機構、Ｆは前記ガラス基板類装入機構Ｅからガラス基板類Ｗを受けとって入口ラインすなわち上側ウォーキングビーム機構の上方に移送するガラス基板類引取り移動機構、Ｇは下側ウォーキングビーム機構Ｃ’からトレイＴを受取り、上側ウォーキングビーム機構Ｃへと移送させる入口側トラバース機構である。この実施例では入口側トラバース機構はまた入口ラインと平行な方向にトレイを移動する手段を兼ねているが、これに限定されるものではない。

Ｈは出口ａ’の側方の処理室内に必要に応じて配置されるトレイ洗浄機構であり、この実施例では図１のように出口ラインの両側に１つずつ配置されているが、片側だけでもよい。

Ｊは出口ラインにおいて上側ウォーキングビーム機構Ｃからトレイ Ｔを受取って下側ウォーキングビーム機構Ｃ’へと移置させるための出口側トラバース機構である。この実施例では出口側トラバース機構Ｊはトレイ Ｔを受取って出口ラインとトレイ洗浄機構Ｈの間で平行移動し得るようにしているが、これに限定されるものではない。

Ｌは抽出口ｂ’に配置されたガラス基板類抽出機構、Ｋはガラス基板類抽出機構Ｌよりも上流側の出口ライン上に設けられたガラス基板類冷却機構、Ｍは出口側トラバース機構Ｊからガラス基板類を受取ってガラス基板類冷却機構Ｋとガラス基板類抽出機構Ｌへ順次移送するためのガラス基板類引取り移動機構である。

【０００９】

上昇エレベータ機構Ｕは、図２に示す上側ウォーキングビーム機構Ｃの上昇位置よりやや上位レベルにおいて垂直軸線のまわりで回動自在な複数のトレイ支持具７を有している。それらトレイ支持具７は、図示するものでは４つであり、それぞれ図１０と図１４および図１５のように、幅と長さ寸法が異なるたとえば長方形状のプレートないしブロックとして構成され、長片が内方に向いた時にトレイＴの隅部底面すなわち支柱フランジ６００を支え、長片がたとえば９０度回転したときにトレイＴの支えを解除しうるようになっている。トレイ支持具７の自由端付近には支柱６の第１部体６ａに横から係脱する溝７００が設けられている。　前記トレイ支持具７は、図２と図３のように炉体Ａの下方から炉床を貫いて伸びる複数本(図面では4本)の支持ロッド７０１の上端に取付けられており、各支持ロッド７０１は炉床ｃの下方に横架された横梁７０２に中間を保持され、下端がベースフレームに設けた軸受で支承され、軸受の近傍に回転要素たとえばベーベルギヤ７０３が取付けられ、駆動側のベーベルギヤ７０４を図示しないロータリアクチュエータで一斉に駆動するようにしている。ロータリアクチュエータは各支持ロッドごとでもよいし２本ずつあるいは全体を一基で作動させてもよい。

【００１０】

上昇エレベータ機構Ｕはさらに、前記トレイ支持具７よりも下位すなわち常態において上側ウォーキングビーム機構Ｃの後述する平行ビーム１２，１２の上昇

時受支面よりも下位レベルに位置し、平行ビーム１２，１２の下降時にトレイＴを受取り前記トレイ支持具７に向かって上昇させるトレイ上昇具９が配されている。

前記トレイ上昇具９は少なくとも一対からなり、側面側から見て前記支持ロッド７０１の内側(正面側では図３のように支持ロッド７０１とほぼ同一垂直面上にある）に配されている。各トレイ上昇具９はプレート状ないし爪状をなし、先端部にトレイＴの支柱６に対するボス状の支え９００を有し、その支え９００は支柱端面の凸部が嵌ま凹部を有している。

トレイ上昇具９は、複数組(図面では２組)の支持シャフト９０１の上端に固定されており、支持シャフト９０１はトレイ上昇具９が常態において上側ウォーキングビームＣの上限位置よりも下位にあり、このレベルから図１５のようにトレイ支持具７の近傍レベルまで昇降できるように、炉床ｃを貫いて炉内に伸び駆動機構に連結されている。

この実施例では支持シャフト９０１は横梁７０２を貫いて伸び、連結板９０２によって結合され、その連結板９０２が昇降用アクチュエータ９０３によって作動させられるようになっている。昇降用アクチュエータ９０３は油圧シリンダなど任意であるが、この実施例ではモータが使用され、その出力側に連結したボールスクリュー軸９０４が横梁７０２に軸受で保持され、ボールスクリュー軸９０４に連結板９０２に固定した雌ねじ部材９０５が螺合している。

なお、図９のように入口領域と出口領域の高さ方向中間から上には中位フレーム１０を介して固定トレイ支え８’が設けられている。この固定トレイ支え８’は複数本のピンまたは平行プレートからなり、上側ウォーキングビーム機構Ｃにより入口ａから装入されたトレイ、炉内から出口ａ’に運ばれる前のトレイＴを上側ウォーキングビーム機構Ｃの下降時に支えるためのものである。

また、入口領域と出口領域、および上昇エレベータ機構下方と下降エレベータ機構下方の各炉床部位には、下側ウォーキングビーム機構Ｃ’の平行ビーム１７，１７の上昇レベルよりも低く下降レベルよりも高い固定トレイ支え８が配置されており、下側ウォーキングビーム機構Ｃ’の平行四辺形運動の際にトレイをそれぞれの位置で受支するようになっている。

【００１１】

下降エレベータ機構Ｄは前記上昇エレベータ機構Ｕと構成は同じであり、上側ウォーキングビーム機構Ｃの上限レベルよりやや上位で間隔的に配置され、トレイＴを積載状に支えるとともに垂直軸線のまわりで９０度以上回転してトレイＴの支えを解除しうるトレイ支持具７’と、該トレイ支持具７’よりも下位にあってトレイＴを支えつつトレイ支持具７’に向かって上昇させるトレイ下降具９’とを備えている。

それらトレイ支持具７’およびトレイ下降具９’は構造的には上昇エレベータ機構Ｕと同じであり、したがって、同じ部分にカンマ付きの符号を付し、説明は省略する。

なお、この実施例では上昇エレベータ機構Ｕと下降エレベータ機構Ｄの位置でのトレイ支えとしてトレイ上昇具９とトレイ下降具９’を用いているが、場合によっては中位フレーム１０を介して固定トレイ支えを設けてもよいことは勿論である。この場合トレイ上昇具９とトレイ下降具９’は固定トレイ支えよりも適度に下のレベルで待機する。

【００１２】

次に、トレイ昇降切換え機構Ｖは、前記上昇エレベータ機構Ｕで積載された最上位のトレイを受取り、これを下降エレベータ機構Ｄに積載されている最上位のトレイに横送りするための手段であり、上昇エレベータ機構Ｕと下降エレベータ機構Ｄと協働してウオーキングビーム運動を行い、摺動を伴わずにトレイを移置するものである。

このトレイ昇降切換え機構Ｖは、図２と図３、図２５ないし図２７のように炉体天井部に近いレベルにおいて、前記上昇エレベータ機構Ｕおよび下降エレベータ機構Ｄと直交するように炉体側壁を貫通し、しかも図３のように互いの間隔がトレイＴの幅よりも少し大きい２本の横ビーム１１，１１と、この横ビーム１１，１１にそれぞれ固定され、トレイＴ幅寸法内に突出する寸法を持ったトレイ受け具１１０，１１０と、２本の横ビーム１１，１１を所定のプログラムに従って軸線方向に正逆移動させる駆動手段とを有している。

駆動手段は任意であるが、この実施例ではねじ送り方式を採用しており、炉体

Aの外側またはボックス状カバーに架台１１２を固定し、これにモータ１１１で駆動回転されるボールスクリューねじ１１３を横架するとともに、ボールスクリューねじ１１３に横ビーム１１，１１の後端と結合しためねじ部材１１４を螺合している。

そして、横ビーム１１，１１の先端側にはスライダ１１５が設けられ、炉体Aの外側またはボックス状カバーに固定したガイドブロック１１２’によってガイドされるようになっている。なお、前記仕切り２は横ビーム１１，１１とトレイTが自由に移動しうるように窓孔を有している。

【００１３】

次に上側ウォーキングビーム機構Cは、時計方向での上昇－前進－下降－後退の平行四辺形運動により操業中ではトレイTを入口ラインから入口aを経て入口域そして上昇エレベータ機構部位へと移送させ、また下降エレベータ機構Dで下降送りされてきた積載最下位のトレイを出口域、次いで出口a’を介して出口ラインへと搬出するためのものである。これに対して、下側ウォーキングビーム機構C’は反時計方向で上昇－前進－下降－後退の平行四辺形運動することにより、ガラス基板類Wを分離した空トレイTを出口ラインから出口域、炉内そして入口域さらに入口aを介して入口ラインにリターンするためのものである。

まず、上側ウォーキングビーム機構Cは、入口aと出口a’を貫通する長さの２本の平行ビーム１２，１２を有している。詳細には、平行ビーム１２，１２は常に前記トレイ支持具7，7’より低いレベルにあり、また幅方向では図３のように支持ロッド７０１，７０１’の内側位置にあり、かつ、互いの間隔がトレイTの幅より小さい寸法にある。平行ビーム１２，１２は好ましくは長手方向両端部がそれぞれ横梁によつて連結され、全体として長尺枠状となっている。

入口ラインと出口ラインのフレームFには平行ビーム１２，１２の真下ないし下側方に２本一組のガイドレール１３，１３’がそれぞれ架台を介して敷設されている。このガイドレール１３，１３’に油圧式または機械式のジャッキ１４，１４’が左右２個ずつ摺動可能に取付けられており、ジャッキ１４，１４’の各作動ロッドは平行ビーム１２，１２の長手方向端部ないしこれに付設した張出し部材に連結しており、したがってジャッキ１４，１４’の同期作動によって平行

ビーム１２，１２はトレイ上昇具９やトレイ下降具９’の上面より少し上に達する寸法だけ上昇される。

そして、片側(この例では入口ライン側)の２本のガイドレール１３にはブラケットを介してそれぞれモータ１６によって駆動回転されるボールスクリュー軸１６０が支架され、そのボールスクリュー軸１６０にジャッキ１４の基部に固定した図示しないめねじ部材が係合している。したがって、平行ビーム１２，１２は、モータ１６の同期駆動により、入口ライン側に突出した状態から図１と図２に示すように出口ラインに突出した状態となるようにストロークされる。

【００１４】

下側ウォーキングビーム機構C’も同様に入口ａと出口ａ’を貫通する２本の平行ビーム１７，１７を有し、好ましくは長尺枠状をなしている。この平行ビーム１７，１７は常に高さ方向では前記トレイ上昇具９(トレイ下降具９’)よりも低位レベルにあり、また幅方向では図３のように固定トレイ受け８，８’の内側にある。

入口ラインと出口ラインには、平行ビーム１７，１７の直下または下側方(いずれも前記ガイドレール１３，１３’よりも内側)に、前記架台を介して２本一組のガイドレールが敷設され、それらガイドレールに油圧式または機械式のジャッキ１８，１８’が左右２個ずつ摺動可能に取付けられている。ジャッキ１８，１８’の各作動ロッドは各平行ビーム１７，１７の長手方向端部に連結しており、したがってジャッキ１８，１８’の同期作動によって平行ビーム１７，１７は固定トレイ支え８の上端より少し上のレベルに到る寸法だけ上昇される。

そして、片側の２本のガイドブロックの下には、ブラケットを介してそれぞれモータ１９の出力部と連結したボールスクリュー軸１９０が横架され、そのボールスクリュー軸１９０にジャッキ１８の基部に固定した図示しないめねじ部材が係合している。したがって、下側の平行ビーム１７，１７は、２つのモータ１９の同期駆動によって、出口ラインへの突出状態から、図２に示すような入口ライン突出状態になるようストロークされる。

【００１５】

ガラス基板類装入機構Ｅは、装入口ｂからガラス基板類Ｗを引込みかつこれを

引込み位置で上昇させる手段であり、図１と図５に示されているように、ボックス状カバーＢの装入口ｂの直近から炉体入口方向に伸び、かつ高さ方向では図２と図８のように上側ウォーキングビーム機構Ｃの平行ビーム１２，１２とほぼ同等のレベルに設けられている。ガラス基板類装入機構Ｅは、この実施例では、フレーム等に支えられた架台２０にＯリングベルトなどをガラス基板類Ｗの幅よりも狭い間隔に設定した多条ベルトコンベア２１を配置し、多条ベルトコンベア２１の近傍にペンシン型などの押上げ用シリンダ２２，２２を配置している。

押上げ用シリンダ２２，２２は少なくとも４本(2枚のガラス基板類Ｗを同時処理する場合は少なくとも8本)であり、押上げピン２２０はそれぞれトレイＴの前記孔ｔ１，ｔ２，ｔ３のいずれとも位相がずれた間隔で配置され、常態において多条ベルトコンベア２１の張り側より下位のレベルにある。

【００１６】

ガラス基板類引取り移動機構Ｆは、前記ガラス基板類装入機構Ｅの押上げピン２２０で持ち上げられたガラス基板類Ｗを受支して入口ライン(上下の平行ビーム12, 12, 17, 17のストローク位置)に移動するための手段であり、図１、図２、図５ないし図８に示されている。

このガラス基板類引取り移動機構Ｆは、ボックス状カバーＢの装入口ｂの直近から炉体入口方向に伸びるように架設された２条の平行ガイドレール２３，２３と、それら平行ガイドレール２３，２３に基部２４０をもって摺動可能に取り付けられた爪状または板状の支え２４，２４と、平行ガイドレール２３と平行に配され、支え２４の基部２４０を螺通するボールねじ２５とこれを駆動するモータ２５１を備えている。

平行ガイドレール２３，２３は図５のようにトレイＴの幅よりも広い間隔を有し、支え２４，２４の支え面はガラス基板類Ｗの両側下面を支えうるように張出し、かつ、前記多条ベルトコンベア２１の張り側および平行ビーム１２，１２の上昇レベルよりも高いレベルにあり、支え２４，２４は前記モータ２５１の駆動により図４の実線で示すガラス基板類装入機構直上位置(引取り位置)と仮想線で示す前送位置の間で往復動自在となっている。

【００１７】

入口側トラバース機構Ｇは、基本的には下側ウォーキングビーム機構Ｃ’でリターンされたトレイを受けとって上側ウォーキングビーム機構Ｃに受支させるべく上昇させるエレベータ手段であるが、これに加えて前記ガラス基板類引取り移動機構Ｆと協働してガラス基板類Ｗをトレイ Ｔに受載させる手段も兼ねている。この実施例では、さらには新たなトレイまたは補修したトレイを外部から熱処理ラインに供給する手段をも兼ねている。

入口側トラバース機構Ｇは、従ってこの実施例では昇降可能かつ平行移動可能であり、図１、図２、図５および図８のように、ボックス状カバーＢの装入口側壁面と平行状の梁フレーム２６に横架された上下の横ガイドレール２７，２７と、それら横ガイドレール２７，２７に背部をもって摺動可能に保持されかつ横ガイドレール２７，２７間に横架したボールねじ２９に螺合する雌ねじ部材２８０を備えた第１フレーム２８と、雌ねじ部材２８０を駆動する横送り用モータ２８１と、第１フレーム２８の前部側に設けた縦ガイドレール３０，３０に背部をもって摺動可能に保持されかつ縦ガイドレール３０，３０に縦架したボールねじ３１に螺合する雌ねじ部材３２０を備えた第２フレーム３２と、雌ねじ部材３２０を駆動する上下送り用モータ３２１と、第２フレーム３２に基部が固定された２本の平行アーム３３，３３からなっている。横ガイドレール２７，２７は前記ガラス基板類装入機構Ｅよりも下位にあり、長手方向ではボックス状カバーＢの他側壁b_1の近くまで伸びている。昇降機能だけの場合には縦ガイドレール３０，３０が梁フレーム２６に固定される。

平行アーム３３，３３は図５のように上側ウォーキングビーム機構Ｃの平行ビーム１２，１２の間隔L_1よりも狭く、下側ウォーキングビーム機構Ｃ’の平行ビーム１７，１７の間隔L_2よりも広い間隔、すなわちトレイＴのトレイトラバース時位置決め用孔ｔ１とガラス基板類昇降用孔ｔ３に対応する間隔L_3を有し、さらに平行アーム３３，３３は上面すなわちトレイ受支面に、トレイのトラバース用位置決め用孔ｔ１に合致する間隔で位置決め用の突起３３１，３３１が設けられ、また、ガラス基板類昇降用孔ｔ３に合致する間隔で押し上げピン３３０，３３０が突設されている。図１１のトレイの場合には図１２のように片側４本ずつの押し上げピン３３０が設けられる。

平行アーム３３，３３は、常態において下側ウオーキングビーム機構Ｃ’の平行ビーム１７，１７（上昇位置）の受支面よりも適度に下のレベルに位置し、前記上下送り用モータ３２１の駆動により上側ウオーキングビーム機構Ｃの平行ビーム１２，１２(下降位置)の受支面より高いレベルに上昇するストロークが設定される。平行アーム３３，３３は前記上昇時にガラス基板類装入機構Ｅと衝突しない幅方向間隔を有していれば水平状でもよいが、この実施例では上昇時にガラス基板類装入機構Ｅと衝突しないように高さ方向で段差を設けている。

平行アーム３３，３３は第１フレーム２８の移動によって図１と図４のようにボックス状カバーＢの他側壁b_1の近くに平行移動された状態で新規なトレイまたは補修済みのトレイを処理系に取り入れることができるようにするため、他側壁b_1にはスライド式またはヒンジ式に開閉自在なトレイ挿入口３４が設けられている。

なお、入口側トラバース機構Ｇと後述する出口側トラバース機構Ｊの昇降駆動手段、および上側、下側の平行ビーム１２，１２，１７，１７の軸線方向移動用の駆動手段は実施例のようにボールスクリュー式に限定されず、油圧シリンダ式などであってもよい。

【００１８】

トレイ洗浄機構Ｈと、出口側トラバース機構Ｊと、ガラス基板類冷却機構Ｋと、ガラス基板類抽出機構Ｌおよびガラス基板類引取り移動機構Ｍの詳細は図１６ないし図２２に示されている。

トレイ洗浄機構Ｈは、この実施例では２基であり、それぞれ炉体出口ラインの側方のフレーム上に据え付けられた洗浄槽３５と、これの近傍に設置され出口側トラバース機構Ｊで搬送されたトレイＴを受支して洗浄槽３５に浸漬させるためのトレイ昇降機構３６を備えている。洗浄槽３５は洗浄液３５１が満たされ、内底など適所に超音波発振器３５０が取り付けられている。

トレイ昇降機構３６は、反出口側トラバース機構側の位置に立設された架台３６０と、架台３６０に設けた縦ガイドレール３６１，３６１に背部を持って摺動可能に保持され、かつ縦ガイドレール３６１，３６１間に縦架したボールねじ３６２に螺合する雌ねじ部材３６３を有するスライド３６４と、ボールねじ３６２

を駆動するモータ３６５と、このスライド３６４の前部に固定された平行アーム３７，３７とを有している。

前記平行アーム３７，３７は図１のように出口側トラバース機構Ｊの後述する平行アーム３３’，３３’よりも広い間隔すなわち、前記したトレイＴの洗浄用位置決め孔ｔ１に対応する間隔を有し、受支面には洗浄用位置決め孔ｔ１に合致する位置決めピン(突起でもよい) ３７０，３７０を突設している。

【００１９】

出口側トラバース機構Ｊは、基本的には上側ウォーキングビーム機構Ｃによって出口ラインに搬出されたトレイＴを受けとって下側ウォーキングビーム機構Ｃ’に受支させるべく下降移動するエレベータ手段であるが、これに加えてガラス基板類引取り移動機構Ｍと協働してトレイＴをガラス基板類と分離する機能を有している。また、この実施例では、ガラス基板類を分離した空トレイを前記トレイ洗浄機構Ｈに横送りし、洗浄した空トレイを再び出口ラインに戻す機能を有している。

該出口側トラバース機構Ｊは前記入口側トラバース機構Ｇと同様な構造である。すなわち、ボックス状カバーＢの抽出口側壁面と平行状の梁フレーム２６’に横架された上下の横ガイドレール２７’，２７’と、それら横ガイドレール２７’，２７’に背部をもって摺動可能に保持されかつ横ガイドレール２７’，２７’間に横架したボールねじ２９’に螺合する雌ねじ部材２８０’を備えた第１フレーム２８’と、雌ねじ部材２８０’を駆動する横送り用モータ２８１’と、第１フレーム２８’の前部側に設けた縦ガイドレール３０’，３０’に背部をもって摺動可能に保持されかつ縦ガイドレール３０’，３０’に縦架したボールねじ３１’に螺合する雌ねじ部材３２０’を備えた第２フレーム３２’と、雌ねじ部材３２０’を駆動する上下送り用モータ３２１’と、第２フレーム３２’に基部が固定された２本の平行アーム３３’，３３’からなっている。

横ガイドレール２７’，２７’は前記ガラス基板類抽出機構Ｌとガラス基板類冷却機構Ｋよりも下位にあり、長手方向ではボックス状カバーＢの前後側壁b_1，b_2の近くまで伸びている。

平行アーム３３’，３３’は図１７のように上側ウォーキングビーム機構Ｃの

平行ビーム１２，１２の間隔よりも狭く、下側ウォーキングビーム機構Ｃ’の平行ビーム１７，１７の間隔よりも広い。すなわちトレイＴのトラバース用位置決め用孔ｔ１とガラス基板類昇降用孔ｔ３に対応する間隔を有している。また、平行アーム３３’，３３’はトレイ受支面にトラバース用位置決め孔ｔ１に合致する間隔の位置決め用の突起３３１’，３３１’が設けられ、また、ガラス基板類昇降用孔ｔ３に合致する間隔の押し上げピン(または突起)３３０’，３３０’が突設されている。

平行アーム３３’，３３’は、常態において下側ウオーキングビーム機構Ｃ’の平行ビーム１７，１７（上昇位置）の上面よりも適度に下のレベルに位置し、前記上下送り用モータ３２１’の駆動時に上側ウオーキングビーム機構Ｃの平行ビーム１２，１２(上昇位置)の上面より高いレベルに上昇するストロークが設定される。平行アーム３３’，３３’は前記上昇時にガラス基板類冷却機構Ｋと衝突しないように高さ方向で段差を有している。

平行アーム３３’，３３’は第１フレーム２８’の移動によってトレイ洗浄機構Ｈに平行移動されるが、トレイ洗浄機構Ｈはボックス状カバーＢの前後側壁b_1，b_2に近接しており、そこで、その他側壁b_1，b_2にはスライド式またはヒンジ式に開閉自在なトレイ取出し口３８，３８が設けられ、洗浄したトレイあるいは洗浄しないままのトレイを回収できるようにしている。

【００２０】

本考案で特徴とするガラス基板類冷却機構Ｋとガラス基板類抽出機構Ｌは図１と図１６のように出口ライン上に直列状に配置されている。

まず、ガラス基板類冷却機構Ｋは、前記した徐冷機構Ｐにより徐冷されたガラス基板類Ｗを急速に冷却して温度降下を促進し、装置からの搬出および収納ボックスＱ(図23, 24参照)への装入を円滑に能率よく行うためのものである。

ガラス基板類冷却機構Ｋは、基床から立ち上がる支持手段３９０により図１４のように上側ウェーキングビーム機構Ｃの平行ビーム１２，１２(上昇位置)とほぼ同等の高さレベルに固定されたクールボックス３９からなり、上部にはステンレス板などからなる受載冷却面３９４を有し、ボックス内には給水管３９１と排水管３９２によって水などの冷媒３９３が満たされ、かつ外部の供給源との間で

循環されるようになっている。

そしてクールボックス３９の所定位置には、後述するガラス基板類引取り移動機構Mにより直上まで移動されてきたガラス基板類を浮上・下降させ冷却後は受載冷却面から浮上させるための昇降手段４０が取付けられており、常態において作動ロッド４００はクールボックス３９の受載冷却面３９４よりも下のレベルにある。昇降手段４０は図１９では４個所であるが、２枚のガラス基板類を同時に冷却する場合には、４か所ずつを２組設ける。

ガラス基板類抽出機構Ｌは、冷却されたガラス基板類を装置外に搬出するためのものであるが、さらにこの考案では搬出に先だってガラス基板類を水平状のまま１８０度反転させ、ガラス基板類の方向性を調整する機能を有している。

詳述すると、ガラス基板類抽出機構Ｌは全体としてボックス状カバーＢの抽出口ｂ’から外方に伸び、かつ高さ方向では前記クールボックス３９とほぼ同等のレベルに設けられている。まず、ガラス基板類抽出機構Ｌは、前記ガラス基板類装入機構Ｅと同様にフレーム等に支えられた架台２０’にＯリングベルトなどをガラス基板類Wよりも間隔を狭くとった２基の多条ベルトコンベア２１’，２１’を出口ライン方向で適度に間隔を置いて直列状に配置している。そして、多条ベルトコンベア２１’，２１’の間には、それらの長手方向に伸び中間に幅方向に張り出すアーム部４４０，４４０を備えた受台４４を配しており、該受台４４は中央部下方に設けた反転用アクチュエータ４５に支持されている。受台４４は常態において図２１のように多条ベルトコンベア２１’，２１’の搬送面よりも下位のレベルに保持されている。

反転用アクチュエータ４５はこの実施例では、昇降自在かつ回転自在なロボットシリンダが用いられているが、これに限定されるものではなく、上下用と回転用の各モータを組み合わせた機械的形式のもの(たとえば前記トレイ支持具やトレイ上昇具に用いられていたようなもの)でもよい。

なお、受台４４の長手方向端部とアーム部４４０，４４０の端部にはガラス基板類の位置ずれを防止するためそれぞれ立上り部４４１を有している。

【００２１】

ガラス基板類引取り移動機構Mは、上側ウォーキングビーム機構Ｃで移送され

たトレイＴ(ガラス基板類が受載されているアッセンブリトレイ)から前記出口側トラバース機構Ｊと協働してガラス基板類を分離し、これを受支してガラス基板類冷却機構Ｋとガラス基板類抽出機構Ｌの直上に順次移動させるための手段である。

このガラス基板類引取り移動機構Ｍは、ガラス基板類抽出機構Ｌの側方から炉体出口方向に伸びるように架設された２条の平行ガイドレール２３’，２３’と、それら平行ガイドレール２３’，２３’に基部２４０’をもって摺動可能に取り付けられた爪状または板状の支え２４’，２４’と、平行ガイドレール２３’と平行に配され、支え２４’の基部２４０’を螺通するボールねじ２５’とこれを駆動するモータ２５１’を備えている。

平行ガイドレール２３’，２３’は図１６のようにトレイＴの幅よりも広い間隔を有し、支え２４’，２４’の支え面はガラス基板類Ｗの両側下面を支えうるように張出し、かつ、前記多条ベルトコンベア２１’の張り側および平行ビーム１２，１２の上昇レベルよりも高いレベルにあり、支え２４’，２４’は前記モータ２５１’の駆動により図１６に示すガラス基板類抽出機構Ｌの位置とガラス基板類冷却機構Ｋおよび炉体出口外側位置の間で往復動自在となっている。

【００２２】

実施例は本考案の一例であり、ガラス基板類装入機構Ｅは場合によってはボックス状カバーＢの装入口ｂよりも外方に伸びていてもよく、この場合にはガラス基板類引取り移動機構Ｆは出口側のガラス基板類引取り移動機構Ｍと同様に外方に延長される。

また、本実施例では炉体Ａの入口域と出口域でそれぞれトレイを受支させているが、入口外から直ちに熱処理ゾーンに入れ、熱処理ゾーンから直ちに出口外に搬出するようにしてもよい。

また、この実施例では出口側トラバース機構Ｊが１基であるが、図１の仮想線で示すように２基としてもよい。この場合、２基の出口側トラバース機構Ｊはボールねじ２５’とモータ２５１が共用であり、一方が図１の実線のように洗浄槽位置にあるときに、他方が出口ライン上に位置する作動関係となるように配置される。

【００２３】

操業に当たっては、初期セット状態を形成しておく。これは炉体の一部を開放してトレイをつめ込む方法としてもよいが、この例のように入口側トラバース機構Ｇが入口ラインに対し平行移動できる場合はより簡便である。すなわち、第２フレーム３２を下降させた状態で横送りモータ２８１を駆動し、第１フレーム２８と平行アーム３３，３３を図１のように入口ラインに対し平行移動させる。これにより平行アーム３３，３３の受支部がトレイ挿入口３４の近傍に位置する。そこでトレイ挿入口３４を開き、トレイＴを平行アーム３３，３３に載せるものであり、平行アーム３３，３３の受支部にはトレイＴのトラバース用位置決め孔ｔ２に合致した間隔で突起３３１を有しており、またガラス基板類昇降用孔ｔ３に合致した間隔で押し上げピン３３０が配置されているため、トレイＴは突起３３１と押し上げピン３３０によって規定位置に安定よく支えられる。そこでこの状態で横送りモータ２８１を逆駆動し、第１フレーム２８と平行アーム３３，３３を図５の実線のように入口ライン上に移動させる。

この状態で上側ウオーキングビーム機構Ｃのモータ１６を駆動すれば、平行ビーム１２，１２は平行アーム３３，３３の高さレベルよりも低い下降位置で炉体Ａの入口ラインに所定長さ突出する。そこで次にジャッキ１４，１４’を作動すれば平行ビーム１２，１２は上昇し、それによって平行アーム３３，３３に受支されていたトレイＴは平行ビーム１２，１２に受支される。平行ビーム１２，１２へのトレイの受支は、平行アーム３３，３３のライン上への移動後一旦上下送りモータ３２１により平行アーム３３，３３を上昇させ、平行ビーム１２，１２の後進後、上下送りモータ３２１により平行アーム３３，３３を下降させる形式としてもよい。

【００２４】

次にモータ１６を逆駆動すれば、平行ビーム１２，１２は図２のように出口ライン所定長さ突出するように軸線方向に移動し、これによりトレイＴは入口域に到り、次いでジャッキ１４，１４’の下降動で平行ビーム１２，１２が下がることによりトレイＴは固定トレイ支え８’で受支される。

この間に平行アーム３３，３３は前記したトレイ挿入口３４へ平行移動してお

り、次のトレイがトレイ挿入口３４から平行アーム３３，３３に載せられ、再び平行アーム３３，３３の移動により入口ラインに搬送される。

平行ビーム１２，１２が後進後上昇すると、次トレイは平行アーム３３，３３から、先行トレイは固定トレイ支え８’から、それぞれ平行ビーム１２，１２に受支換えされ、次の平行ビーム１２，１２の前進により先行トレイは上昇エレベータ機構Ｕの位置に到り、次トレイは入口域に到る。

先行トレイが到達し、平行ビーム１２，１２が下降すると該トレイは上昇エレ

前記のように平行ビーム１２，１２が下降すると、後行トレイは入口域の固定トレイ支え８’で受支され、その間前記のような平行アーム３３，３３の往復動によって次のトレイが入口ライン上に移送されているため、平行ビーム１２，１２が後進－上昇－前進することにより後行トレイが入口域から上昇エレベータ機構Ｕに、さらに後続のトレイが入口ラインから入口域に移置される。上昇エレベータ機構Ｕに到った後続トレイは、トレイ上昇具９の上昇によって上記のように支柱６を介して持ち上げられ、なおも上昇することによって後続トレイは板部６０１が先行トレイの支柱６と凹凸部を係合しあうように当接する。この状態ときに各トレイ支持具７は罷動し、後続トレイは先行トレイともどもトレイ上昇具９によって支持され、後続トレイが前記位置まで上昇すると、各トレイ支持具７が再び作動位置に戻り、後続トレイが支持され、トレイ上昇具９は元位置に戻る。これで２つのトレイは積層状態となる。

【００２５】

以下、上記したサイクルが繰返されることにより、トレイは外部から自動的に炉内に移送され、順次積み上げられる。かくして上昇域のトレイが所定枚数まですなわち最上位のトレイが昇降切換え機構Ｖの下に達する高さまで積み上げられると上昇エレベータ機構Ｕは作動を休止する。

そして、この状態で今度は前記した入口側トラバース機構Ｇと上側ウオーキングビーム機構Ｃの連携動作により、トレイを上昇エレベータ機構Ｕ域よりもさらに先の下降エレベータ機構Ｄの位置まで移動させるものであり、トレイは上昇エレベータ機構Ｕのトレイ上昇具９で受支され、次いで平行ビーム１２，１２の次のサイクルの上昇時にトレイ上昇具９から平行ビーム１２，１２に受支され、こ

れの前進により下降エレベータ機構Ｄに到る。ここで上記と同じようにトレイ支持具７’とトレイ下降具９’を連携作動させるものである。すなわち下降エレベータ機構Ｄを上昇エレベータ機構として作動させるものである。

こうすれば、トレイは下降域において高さ方向に順次積み上げられ、トレイが所定枚数まですなわち最上位のトレイが昇降切換え機構Ｖの下に達する高さに達したところで下降エレベータ機構Ｄの作動を停止させる。以上で炉内にトレイが必要枚数積み上げられた初期状態が創生される。

【００２６】

そして、上昇エレベータ機構Ｕと下降エレベータ機構Ｄを停止させた状態で、入口側トラバース機構Ｇと上側ウオーキングビーム機構Ｃと下側ウォーキングビーム機構Ｃ’および出口側トラバース機構Ｊを連携作動させる。これによりトレイ挿入口３４から挿入したトレイは時計方向の平行四辺形運動により入口域－上昇エレベータ機構域－下降エレベータ機構域－出口域－出口ラインに順次移送される。出口ラインにおいて、出口側トラバース機構Ｊの平行アーム３３’，３３’の上昇または平行ビーム１２，１２の下降によりトレイは平行ビーム１２，１２から平行アーム３３’，３３’に受支換えされ、平行アーム３３’，３３’がモータ３２１’の駆動により下降し、反時計方向の平行四辺形運動する下側ウォーキングビーム機構Ｃ’の平行ビーム１７，１７が下降位置で出口側に突出し、次いで上昇することによりトレイは平行アーム３３’，３３’から平行ビーム１７，１７に受支換えされる。そして、平行ビーム１７，１７が入口側に突出することによりトレイは出口域に送り込まれ、以下、平行アーム３３’，３３’と平行ビーム１７，１７の連携サイクルの繰返しにより後続トレイは下降エレベータ機構下方域－上昇エレベータ機構下方域－入口域にそれぞれ配置される。

そして、下側ウォーキングビーム機構Ｃ’および出口側トラバース機構Ｊの運転を停止させ、入口側トラバース機構Ｇと上側ウオーキングビーム機構Ｃによりトレイを入口域と下降エレベータ機構域および出口域に配置する。これにより、トレイは、ひとつが入口域の固定トレイ支え８’に支持され、ひとつが下降エレベータ機構Ｄのトレイ下降具９’に支持され、ひとつが出口域の固定トレイ支え８’に受支される。さらにひとつのトレイは出口側トラバース機構Ｃ’の平行ア

ーム３７，３７により受支され、リターン側では出口域下側と両エレベータ機構下側および入口域下側の４つの各固定トレイ支え８にそれぞれトレイが受支される。以上で初期状態が完成する。

【００２７】

以上のように必要枚数のトレイが充填、配置された状態で、ガラス基板類を乾燥、焼成などのため熱処理するに当たっては、トレイを平行アーム３３，３３に載せて入口側トラバース機構Ｇを図５の仮想線のように入口ライン上に移動させた状態とする。このときに、トレイＴの少なくとも４か所のトラバース用位置決め孔ｔ２に平行アーム３３，３３の各突起３３１がそれぞれはまり、また少なくとも４カ所のガラス基板類昇降用孔ｔ３に押し上げピン３３０が貫通している。　この状態でガラス基板類Ｗを挿入口ｂから装入すれば、ガラス基板類装入機構Ｅの多条ベルトコンベア２１の作動によりガラス基板類Ｗは引き込まれ、図６および図８のように多条ベルトコンベア２１の上に受載される。この状態で押し上げ用シリンダ２２，２２を作動すれば、少なくとも４本の押上げピン２２０，２２０が突出し、ガラス基板類Ｗは図６の仮想線のように多条ベルトコンベア２１の直上に水平状に持ち上げられる。

次いでガラス基板類引取り移動機構Ｆのモータ２５１を作動すれば、それまで図５の仮想線のように炉入口寄りに位置していた支え２４，２４がボールねじ２５に沿って左方に移動し、図６のように多条ベルトコンベア２１の真上でかつガラス基板類Ｗの幅方向側部の下面より適度に下に位置する。これが確認されると押し上げ用シリンダ２２，２２が下降作動し、それによりガラス基板類Ｗは支え２４，２４に受支される。

【００２８】

次いでモータ２５１が後退側に作動すると、ガラス基板類Ｗは図７のように平行アーム３３，３３で受支されているトレイＴの真上まで搬送される。この状態で上下送りモータ３２１が作動すると第２フレーム３２の上昇により平行アーム３３，３３も一体に上昇する。トレイＴに押し上げピン３３０が貫通しているため、平行アーム３３，３３の上昇により押し上げピン３３０がガラス基板類に接触し、図７と図８の仮想線のように支え２４，２４からガラス基板類Ｗを所要高

さ浮きあがらせる。この状態でモータ２５１が作動することにより支え２４，２４は装入機構Ｅの位置に逃げる。

この段階で上側ウォーキングビーム機構Ｃの平行ビーム１２，１２(下降位置)が入口ライン側(図面では左方)に突出し、トレイＴの真下の位置に到る。この状態で平行ビーム１２，１２を上昇させるかまたは上下送りモータ３２１の駆動で第２フレーム３２を下降させれば、トレイＴは平行アーム３３，３３から平行ビーム１２，１２の上に受載される。同時に押し上げピン３３０がトレイＴのガラス基板類昇降用孔ｔ３から抜けてゆくため、ガラス基板類は水平のまま下降してトレイＴ内に収納受載され、これでガラス基板類はトレイＴに自動セットされる。

【００２９】

これ以降は、上記した装入作業と、上側ウォーキングビーム機構Ｃ，下側ウォーキングビーム機構Ｃ’、上昇エレベータ機構Ｕ、下降エレベータ機構Ｄ、昇降切換え機構Ｖおよび入口側と出口側の両トラバース機構Ｇ，Ｊの連携作動が行われ、それにより、ガラス基板類アッセンブリ状態のトレイ(以下アッセンブリトレイと称す)は炉外から入口域を経て上昇エレベータ機構Ｕに横送りされ、ここで上昇・支持され、後続のトレイの下からの積み上げにより炉内を順次上昇しながら所定温度に雰囲気加熱され、所定の高さまで達すると昇降切換え機構Ｖにより横送りされて下降エレベータ機構Ｄの最上位のトレイに移置され、次いで炉内を順次下降されながら加熱･徐冷される。この間、最下位のトレイは下降エレベータ機構Ｄによって上側ウォーキングビーム機構Ｃに移置され、トレイは出口域を経て炉外の出口ラインに搬出される。

最初のアッセンブリトレイが下降エレベータ機構Ｄから上側ウォーキングビーム機構Ｃにより出口ラインに搬出されると、出口ラインにおいては、出口側トラバース機構Ｊと引取り移動機構Ｍによりトレイとガラス基板類に分離される。空トレイはそのまま出口側トラバース機構Ｊと下側ウォーキングビーム機構Ｃ’により炉内下部域を逆送される。あるいは出口側トラバース機構Ｊで横送りされてトレイ洗浄機構Ｈにより洗浄され、出口側トラバース機構Ｊで出口ラインに戻されるとともに、下側ウォーキングビーム機構Ｃ’により炉内下部域を逆送され、

入口ラインに戻った空トレイは入口側トラバース機構Ｇにより上昇させられ、前記した操作でガラス基板類がセットされる。

一方、出口ラインでトレイと切り離されたガラス基板類Ｗは、引取り移動機構Ｍによりガラス基板類冷却機構Ｋに移送され、ここで冷却されてからガラス基板類抽出機構Ｌによりボックス状カバーＢ外に抽出され、収納ボックスなどに装入される。

【００３０】

詳しく説明すると、入口ラインに突出していた平行ビーム１２，１２が出口ライン側に前進すると、前記アッセンブリトレイは、炉体入口域に搬入され、一方、入口域にあったアッセンブリトレイは平行ビーム１２，１２に受支されて上昇エレベータ機構Ｕの位置に到り、下降エレベータ機構Ｄのトレイ下降具９’に受支されていたアッセンブリトレイも平行ビーム１２，１２に受支されて出口域に送られ、出口域にあったアッセンブリトレイは出口ａ’に搬出される。

また、出口ラインに突出していた平行ビーム１７，１７が平行ビーム１２，１２と同期して入口ライン側に突出するように前進することにより出口域の空トレイは下降エレベータ機構下側域に、下降エレベータ機構下側域の空トレイは上昇エレベータ機構下側域に、上昇エレベータ機構下側域の空トレイは入口域に、入口域の空トレイは入口ａにそれぞれ移動する。

前記のように、上昇エレベータ機構Ｕの位置に到ったアッセンブリトレイは平行ビーム１２，１２の下降によりトレイ上昇具９により支持され、平行ビーム１２，１２が後退する間に持ち上げられ、トレイ支持具７で支持される。すなわち、トレイ上昇具９の支え９００がトレイＴの下面４隅の支柱６に当接し凸部と凹部が係合し、次いで昇降用アクチュエータ９０３が作動し、これにより支持シャフト９０１が上昇し、図１５のようにトレイＴの下面４隅の支柱６の基部が上方のトレイ支持具７のレベルに達するまで持ち上げられる。この時に支持ロッド７０１が回動し、それにより各トレイ支持具７は図１０の仮想線で示す罷動位置から作動位置に変位し、それぞれの溝７００が支柱６に係合する。次いで、トレイ上昇具９が下降すると各トレイ支持具７の上面がフランジ６００を受支する。これで先行トレイＴは炉内に中空状に支持される。

前記持ち上げ作動により積み上げ状態の最上位のアッセンブリトレイがトレイ昇降切換え機構Ｖの横ビーム１１，１１とほぼ同じ高さレベルに到ると、アクチュエータ１１１が作動して、トレイ受け具１１０，１１０は、図２５(a)の下降エレベータ機構側の位置から図２５(b)および図２６(a)のように最上位のアッセンブリトレイトレイの位置に到る。この状態でトレイ上昇具９が下がると最上位のアッセンブリトレイだけが図２５(c)と図２６(b)のようにトレイ受け具１１０，１１０で受支される。アクチュエータ１１１が逆方向に作動すると、アッセンブリトレイはトレイ受け具１１０，１１０で受支されたまま図２７（ａ）のように下降エレベータ機構Ｄの直上位置に移動する。

このとき、下降エレベータ機構Ｄにおいては、トレイ下降具９’が所定ストローク上昇してトレイ支持具７’で支持されている積み上げ状態のトレイ群を持ち上げるため、下降エレベータ機構側の最上位のアッセンブリトレイによってトレイ受け具１１０，１１０で受支されているアッセンブリトレイが持ち上げられ、トレイ受け具１１０，１１０による受支が解除される。次いで横ビーム１１，１１が左方に移動するため、切換え位置されたアッセンブリトレイは下降エレベータ機構のトレイ下降具９’で受支され、これが下降することにより切換え位置されたアッセンブリトレイは下降側のトレイ群の最上位に積載されたかたちでトレイ支持具７’により支えられる。

【００３１】

トレイ下降具９’の前記した上昇によりアッセンブリトレイ群が持ち上げられ、トレイ支持具７’が罷動したのちトレイ下降具９’が下降してアッセンブリトレイ群の全体が下がり、最下位アッセンブリトレイがトレイ支持具７’の支持レベルより下がり、次位のアッセンブリトレイの支柱ｔが図１２のレベルに到り、トレイ支持具７’が作動位置に戻ることで次位のアッセンブリトレイが最下位トレイとして支持される。そして次いで平行ビーム１２，１２が下限位置で後進し、次のサイクルで上昇するとトレイ下降具９’に一枚だけ載っている最下位アッセンブリトレイは平行ビーム１２，１２に受載される。

【００３２】

この時、炉内のトレイ上昇側とトレイ下降側の上半領域においては、ヒータ１

の熱が循環撹拌ファン３によって加熱雰囲気として調整され、耐熱フィルタ付き吹出し口４からボックス状の仕切り２内に吹き込まれ、各アッセンブリトレイの支柱６によって形成されているそれぞれの空隙を通ってガラス基板類Wを加熱し、排風口５から撹拌ファン３に吸い込まれ強制対流循環加熱が行われる。そして前記のようにアッセンブリトレイは無摺動で順次積み上げられていく。したがってガラス基板類Wはクリーンな条件で能率よく均一加熱される。

そして、トレイ下降側の下半域においては、横仕切板４１で区画された上ゾーンｐでは循環撹拌ファン３の吐出側において雰囲気にヒータ４３の熱量が与えられ、熱風として耐熱フィルタ付き吹出し口４から仕切り２内の搬送空間に吹き込まれ、排風口５から循環撹拌ファン３に吸い込まれる。また、下ゾーンｐ’では、循環撹拌ファン３の吐出側において雰囲気が水冷配管４２により冷され、冷風として耐熱フィルタ付き吹出し口４から仕切り２内の搬送空間に吹き込まれ、排風口５から循環撹拌ファン３に吸い込まれる。該搬送空間は遮熱板４１０でそれより上方の搬送空間と仕切られているため、前記のように吹き込まれた熱風と冷風は当該搬送空間で混合し対流循環するため所要温度の温風となり、したがって搬送空間を通るガラス基板類は適切な温度勾配で徐冷される。この温風温度はヒータ４３の温度調節により任意に制御することができる。

【００３３】

そして、出口域のアッセンブリトレイが図１６のように上側ウォーキングビーム機構Ｃの平行ビーム１２，１２により出口ラインに搬出されると、出口側トラバース機構Ｊの上下送りモータ３２１’が駆動する。それによって平行アーム３３’，３３’は上昇し、押し上げピン３３０’，３３０’がガラス基板類昇降用孔ｔ３を貫通し、受支面がアッセンブリトレイの下面を支持し、突起３３１’，３３１’がトラバース用位置決め孔ｔ２に嵌まる。

平行ビーム１２，１２が下降動すると、トレイは平行アーム３３’，３３’に受支され、同時に前記押し上げピン３３０’，３３０’の突出しによりガラス基板類は図１７と図１９の仮想線のように持ち上げられる。この状態で引取り移動機構Mが連携作動する。すなわち、モータ２５１’が駆動し、それまで他所に位置していた支え２４’，２４’が図１７のようにガラス基板類位置の下方に移動

する。次いで、上下送りモータ３２１’により平行アーム３３’，３３’が下降すると、これと一体の押し上げピン３３０’，３３０’も下降するため、ガラス基板類は下降して支え２４’，２４’に受支される。これでトレイとガラス基板類は自動的に分離される。次いでモータ２５１’が逆方向に駆動することにより支え２４’，２４’はガラス基板類を受支したままガラス基板類冷却機構Ｋの上に移動する。

【００３４】

空トレイは前記のように支え２４’，２４’の移動の後または移動と同期してそのまま下側ウォーキングビーム機構Ｃ’に移置されるか、または、洗浄される。　前者の場合には、平行アーム３３’，３３’はそのまま下降し、次の段階で下側ウオーキングビーム機構Ｃ’の平行ビーム１７，１７が出口ラインに突出し上昇することによってこれに受支換えされ、平行ビーム１７，１７の入口側への突出ストロークによってリターン工程に移行される。

後者の場合には、平行アーム３３’，３３’は横送りモータ２８１’の駆動により出口ラインと平行移動し、空トレイは洗浄槽３５へと移送される。この時洗浄槽近傍のトレイ昇降機構３６においては、図１７のように平行アーム３７，３７が平行アーム３３’，３３’の高さレベルよりも下位に戻されている。平行アーム３３’，３３’が洗浄槽３５上で停止し、この状態でモータ３６５が駆動することにより平行アーム３７，３７が上昇し、平行アーム３７，３７に設けられている位置決めピン３７０，３７０がトレイの洗浄用位置決め孔ｔ１を貫通する。したがってトレイは平行アーム３７，３７に安定的に位置決めされた状態で受支される。この状態とともに平行アーム３３’，３３’は横送りモータ２８１’の駆動により出口ラインに戻り、次のアッセンブリトレイを受支すべく待機し、前記と同じ動作により次のアッセンブリトレイからトレイだけを受支して他方の洗浄槽３５へと移送する。

【００３５】

平行アーム３３’，３３’の移動とともに平行アーム３７，３７はモータ３６５の駆動により洗浄槽３５内に沈降し、洗滌液に浸漬されつつ超音波振動の作用で短時間で洗浄され、汚れおよび異物が除去される。一定時間経過し、モータ３

６５が駆動することにより平行アーム３７，３７は洗浄槽３５から引き上げられる。この状態で他方の洗浄槽へのトレイ移送を終えた平行アーム３３’，３３’が移動して停止すると、モータ３６５の駆動により平行アーム３７，３７は元位置まで下降され、それにより、洗浄済みのトレイはガラス類昇降用孔ｔ３とトラバース用位置決め孔ｔ３と平行アーム３３’，３３’の押し上げピンと突起との関係で位置決め受支される。平行アーム３３’，３３’は次いで横送りモータ２８１’の駆動により出口ラインに戻り、前記のように下側ウォーキングビーム機構Ｃ’の平行ビーム１７，１７の動作によりこれに受支換えされる。従って、トレイを良好なクリーン度に復元されて入口ラインに戻すことができる。

【００３６】

一方、ガラス基板類は、この間に前記のように支え２４’，２４’によってガラス基板類冷却機構Ｋの上に移動され、これで直接冷却されてから抽出機構Ｌに移置され、ここで１８０度反転されてから抽出口ｂ’から外部に搬出される。

すなわち、上記のようにガラス基板類がガラス基板類冷却機構Ｋのクールボックス３９上に到ると、昇降手段４０が作動して少なくとも４本のピン４００がクールボックス３９上に突出し、それによりガラス基板類は支え２４’，２４’の上に浮かされる。

この状態になったときに支え２４’，２４’は出口ラインまたは抽出機構Ｌ上へと移動し、次いで昇降手段４０が後退側に作動することによりガラス基板類は下降してクールボックス３９の受載冷却面３９４に受載される。このクールボックス３９には冷媒が循環されているため、前記工程で徐冷されているガラス基板類は急速に冷却される。

所定時間後、昇降手段４０が再び作動することにより、冷却済みのガラス基板類は上昇させられる。ここで支え２４’，２４’は再びクールボックス３９上に移動し、昇降手段４０の下降動により冷却済みのガラス基板類は支え２４’，２４’により受支され、続いて支え２４’，２４’の移動により抽出機構Ｌの上に移送される。この状態が図２０ないし図２２である。

【００３７】

この図２０ないし図２２ではガラス基板類が２枚の場合を例に取っており、各

ガラス基板類W，Wは一枚ずつ幅方向で向かいあっている支え２４’，２４’により受支されている。

上記のようにガラス基板類W，Wが到ると、それ迄待機位置にあった受台４４が反転用アクチュエータ４５の上昇作動により図２２(b)のように支え２４’，２４’の高さレベルよりも上位まで上昇し、それによりガラス基板類W，Wは受台４４で持ち上げられる。この段階で支え２４’，２４’はクールボックス３９方向へと退避する。そこで反転用アクチュエータ４５を回転駆動すれば、ガラス基板類W，Wは受台４４とともに垂直軸線のまわりで180度回転する。これによりガラス基板類W，Wの進行方向はそれまでの向きと逆転する。

ついで反転用アクチュエータ４５を下降動すれば、ガラス基板類W，Wは受台４４に受載されたまま降下し、その過程でガラス基板類W，Wは図２２（ｃ）のように多条ベルトコンベア２１’，２１’に置かれる。ガラス基板類W，Wは前記のようにクールボックス３９で十分に冷却されているため、多条ベルトコンベア２１’は熱で損傷されることがない。

この状態で多条ベルトコンベア２１’，２１’を駆動することで方向変換されたガラス基板類W，Wは抽出口ｂ’に搬送され、ロード時と同じ方向性を持たされて収納ボックスＱに装入される。

すなわち、収納ボックスＱは図２３のように一側のみ開放され内部に受載仕切りｑを多段状に設けた構造となっており、図２４のようにガラス基板類W，Wは所定の方向、この例では最上位のガラス基板類Ｗ１が収納ボックスＱの奥側に①、開口側に②の方向で納められ、次位のガラス基板類Ｗ２が収納ボックスＱの奥側に③、開口側に④の方向で納められている。この状態で２枚のガラス基板類Wは下位側から取り出され、前記のように挿入口ｂから搬入される。この時のガラス基板類Ｗ１，Ｗ２の方向は下流側から上流側に④③，②①である。この状態でトレイに受載され、前記のように加熱、徐冷、冷却される。

このまま搬出されて収納ボックスに納められた場合には、次工程で処理装置にロードするときに各ガラス基板類Ｗ１，Ｗ２を収納ボックス取出した後、いちいち１８０度反転してからロードしなければならず極めて煩雑である。

本考案では抽出装置に反転機構が設けられているため、前記のように受台４４

の上昇・回転によりガラス基板類Ｗ１，Ｗ２は下流側から上流側に①②，③④と並ぶことになり、抽出口ｂ’から収納ボックスＱに上段から納められることにより、ガラス基板類Ｗ１が収納ボックスＱの奥側に①、開口側に②の方向で、次位のガラス基板類Ｗ２が収納ボックスＱの奥側に③、開口側に④の方向で収納される。従って、次の工程において収納ボックスＱから前工程と同じ方向性でガラス基板類Ｗ１，Ｗ２を取り出すことができる。

【００３８】

【考案の効果】

以上説明した本考案の請求項１によるときには、高さの低い装置でありながら、良好なクリーン度を維持しながらガラス基板類を連続搬送して熱処理することができ、しかもガラス基板類を大きな熱容量のまま常温の炉外に搬出させず炉内でほどよく降温させてから搬出するため、熱歪による切損の発生を防止することができ、さらに出口ライン上で自動的にトレイから分離されるためウオーキングビーム運動式の連続搬送インターバルを短くすることができるとともに、トレイから分離したガラス基板類を単独で急冷するため、次工程への搬出を迅速に実施でき、全体の熱処理能率の向上を図ることができ、また、放冷用のスペースを確保しなくてよいため装置を小型化することができるなどのすぐれた効果が得られる。　また、請求項５，６によれば、冷却したガラス基板類を１８０度反転してから搬出するため、厳密に規定されているガラス基板類の方向性を的確に維持してロード時と同じ方向で収納ボックスに納めることができ、これにより次工程の処理を円滑に能率よく行うことができるというすぐれた効果が得られる。